TM 11-5815-200-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

TELETYPEWRITER SETS

AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64 AN/FGC–66, AN/FGC–67, AN/FGC–67X, AN/UGC–4 AN/UGC–29, AN/UGC–29X AND TELEPRINTER TT–259/FG

HEADQUARTERS, DEPARTMENT OF THE ARMY

FEBRUARY 1966

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when replacing paper. The power supply contains 95- to 250-volt circuits. Serious injury or death may result from contact with these circuits.

DON'T TAKE CHANCES

TECHNICAL MANUAL
No. 11–5815–200–12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *14 February 1966*

Organizational Maintenance Manual Including Repair Parts and Special Tools List

TELETYPEWRITER SETS AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64, AN/FGC–66, AN/FGC–67, AN/FGC–67X, AN/UGC–4, AN/UGC–29, AN/UGC–29X, AND TELEPRINTER TT–259/FG

		Paragraphs	Page
CHAPTER 1.	INTRODUCTION		
Section I.	General	1–1—1–3	1–1
II.	Description and data	1–4—1–14	1–1
CHAPTER 2.	INSTALLATION		
Section I.	Service upon receipt of equipment	2–1—2–3	2–1
II.	Preliminary installation procedures	2–4—2–16	2–4
III.	Installation and line-up	2–17—2–21	2–13
CHAPTER 3.	OPERATING INSTRUCTIONS		
Section I.	Control and indicators	3–1—3–2	3–1
II.	Operation	3–3—3–11	3–3
CHAPTER 4.	MAINTENANCE INSTRUCTIONS	4–1—4–6	4–1
5.	SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE		
Section I.	Shipment and limited storage	5–1—5–2	5–1
II.	Demolition of material to prevent enemy use	5–3—5–4	5–1
APPENDIX I.	REFERENCES		A1–1
II.	BASIC ISSUE ITEMS LIST		A2–1
III.	MAINTENANCE ALLOCATION		A3–1
IV.	ORGANIZATIONAL REPAIR PARTS LIST		A4–1
INDEX			I–1

***This manual supersedes TM 11–5815–200–10, 8 July 1958, including C 1, 4 February 1960, C 2, 3 October 1960, C 3, 14 November 1960, C 4, 11 September 1961, C 6, 1 July 1963; TM 11–5815–200–20P, 15 November 1961; and together with TM 11–5815–200–35, 14 February 1966, supersedes TM 11–5815–200–35, 30 June 1959, including C 1, 11 May 1960, C 2, 30 March 1961, C 3, 18 September 1961, C 4, 5 June 1963, and C 5, 15 January 1964.**

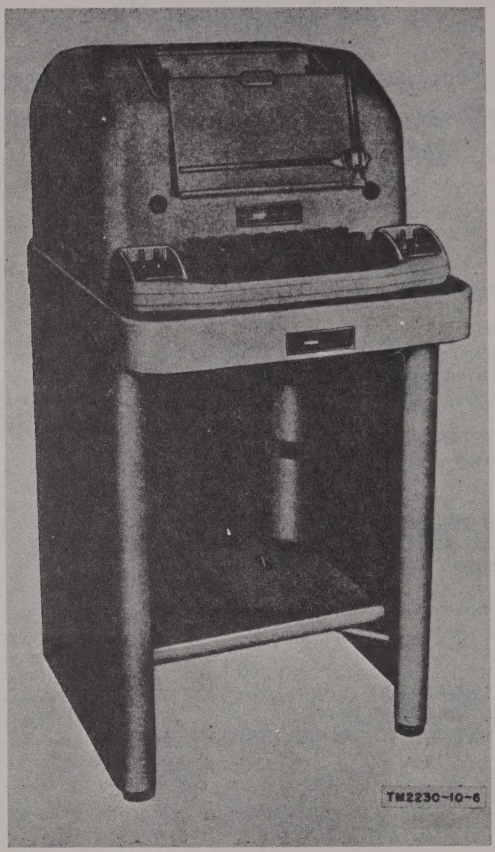


Figure 1-1. Teletypewriter Set AN/FGC-20, less running spaces and technical manuals.

INDEX

	Paragraph	Page
Authority for demolition	5–3	5–1
Bias current adjustment	2–13	2–10
Changing operating speed of teletypewriter, teletypewriter motor and drive gears (fig. 2–8)	2–11	2–9
Changing type basket of Teletypewriter TT–300/FG	2–12	2–10
Checking unpacking equipment	2–2	2–4
Circuit line-up (not applicable to TT–259/FG)	2–21	2–15
Common names	1–8	1–5
Components, running spares (AN/FGC–20, AN/FGC–20X, AN/FGC–21 and AN/UGC–4) (fig. 1–5)	1–7	1–4
Controls and their uses	3–1	3–1
Platen controls and manual space push button (fig. 3–3).		
Standard communications keyboard (fig. 3–1).		
Weather communications keyboard (fig. 3–2).		
Daily preventive maintenance checks and services chart	4–4	4–2
Description of power supply (AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64, AN/FGC–66, and AN/UGC–4) (Power Supply PP–978/FG, fig. 1–7)	1–12	1–5
Description of table (AN/FGC–20, AN/FGC–20X, AN/FGC–21 and AN/FGC–64) (Table FN–59/FG, fig. 1–8)	1–13	1–6
Description of teletypewriter, Teletypewriter TT–98(*)/FG (Teletypewriters TT–99/FG, TT–100(*), TT–293/FG, and TT–300/FG and Teletypewriter Sets AN/FGC–66 and AN/UGC–4 are similar in appearance (fig. 1–6))	1–10	1–5
Description of teletypewriter set	1–9	1–5
Description of TT–259/FG	1–11	1–5
Differences in models	1–14	1–8
Disassembly of equipment	5–1	5–1
Equipment applications	2–17	2–13
Equipment modifications for receiver-only operations (not applicable to TT–259/FG) wiring changes for receive-only operation (fig. 2–11)	2–20	2–14
Equipment performance checklist	2–16	2–11
Forms and records	1–3	1–1
Fuse check	2–5	2–4
Ground and power connections	2–6	2–4
Location of power input fuses and power switch (TT–259/FG) (fig. 2–4).		
Power input fuse and power switch location (not applicable to TT–259/FG) (fig. 2–3).		
Power supply panel (not applicable to TT–259/FG) (fig. 2–5).		
Terminal and switch box and rangefinder dial (fig. 2–9).		
Index of publications	1–2	1–1
Indicators and their uses	3–2	3–3
Installing or changing ribbon, ribbon mechanism (fig. 3–7)	3–7	3–6
Installing paper	3–6	3–4
Fanfold paper placed in table (fig. 3–6),		
Fanfold paper threaded into platen (fig. 3–5).		
Installing paper roll (fig. 3–4).		
Methods of destruction	5–4	5–1
Motor speed adjustment	2–10	2–9
Operating checks (AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64, AN/FGC–66, and AN/UGC–4)	3–9	3–7
Operational checks	2–15	2–11
Preinstallation checks (TT–259/FG)	2–7	2–6

	Paragraph	Page
Preliminary operating checks and adjustments (not applicable to TT–259/TG)	2–8	2–8
Carriage return driving gear blocking plate (fig. 2–7).		
Teletypewriter, dust cover removed, showing platen and carriage locks (fig. 2–6).		
Preliminary starting procedure	3–5	3–4
Preventive maintenance	4–2	4–1
Preventive maintenance checks and service periods	4–3	4–1
Purpose and use	1–4	1–1
System application, block diagram (fig. 1–2).		
Teleprinter TT–259/FG (fig. 1–4).		
Teletypewriter TT–98/FG, keyboard removed (fig. 1–3).		
Rangefinder adjustment	2–14	2–10
Repacking for shipment or limited storage	5–2	5–1
Scope, Teletypewriter Set AN/FGC–20 less running spaces and technical manuals (fig. 1–1)	1–1	1–1
Scope of maintenance	4–1	4–1
Signal line connections, signal line connections (not applicable to TT–259/FG) (fig. 2–10)	2–18	2–13
Signal line connections and final adjustments (TT–259/FG)	2–19	2–13
Siting	2–3	2–4
Starting procedure (AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64, AN/FGC–66, and AN/UGC–4)	3–8	3–7
Stopping procedure (AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64, AN/UGC–4 and AN/FGC–66)	3–10	3–7
Stopping procedure, TT–259/FG	3–11	3–7
Switch settings (not applicable to TT–259/FG)	2–9	2–9
Technical characteristics (AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64, AN/FGC–66 and AN/UGC–4)	1–5	1–1
Technical characteristics (TT–259/FG)	1–6	1–3
Tools and lubricants required	2–4	2–4
Types of operation (AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64, AN/FGC–66, and AN/UGC–4)	3–3	3–3
Types of operation TT–259/FG	3–4	3–4
Unpacking	2–1	2–1
Teletypewriter Table FN–59/FG packaged for export shipment (fig. 2–1).		
Teletypewriter T–98B/FG packages for export shipment (fig. 2–2).		
Visual inspection	4–6	4–2
Weekly preventive maintenance checks and services	4–5	4–2

APPENDIX I

REFERENCES

DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TM 38–750	Army Equipment Record Procedures.

APPENDIX II

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This appendix lists items supplied for initial operation and for running spares. The list includes tools, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

a. Federal Stock Number. This column lists the 11-digit Federal stock number.

b. Designation by Model. Not used.

c. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

d. Unit of Issue. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

e. Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.

f. Quantity Authorized. Under "Items Comprising an Operable Equipment," the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spare Items" the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

g. Illustration. The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

SECTION II. OPERATOR'S FUNCTIONAL PARTS LIST (AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/FGC-66, AN/UGC-4)

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
						FIGURE NO.	ITEM NO
5815-503-2652		TELETYPEWRITER SET AN/FGC-20: fixed station; std comm keyboard; English characters 72 per line; friction or sprocket feed; sync motor, ac, 115 v, 60 cyc; 368 and 600 opm; 7.42 unit code				1	
5815-392-7743		TELETYPEWRITER SET AN/FGC-20X: fixed station; std comm keyboard; English characters, 72 per line; friction or sprocket feed; series governed motor, ac, 115 v, 50/60 cyc, dc, 115 v; 368 and 600 opm; 7.42 unit code					
5815-557-5970		TELETYPEWRITER SET AN/UGC-4: fixed station; std comm keyboard; English characters, 72 per line; friction or sprocket feed; series governed motor, AC, 115 v, 50/60 cyc, DC, 115 v; 368 and 600 opm; 7.42 unit code					
5815-503-2653		TELETYPEWRITER SET AN/FGC-21: fixed station weather comm keyboard; weather comm symbols, 76 per line; friction or sprocket feed; sync motor; ac, 115 v, 60 cyc, 368 and 600 opm; 7.42 unit code					
5815-817-9277		TELETYPEWRITER SET AN/FGC-66: fixed station; std comm; English characters, 72 per line; friction or sprocket feed; series governed motor, ac, 50/60 cyc: dc 115 v, 368 and 600 opm; 7.42 unit code; removable type basket					
		ITEMS COMPRISING AN OPERABLE EQUIPMENT					
ORD THRU AGC		TECHNICAL MANUAL 11-5815-200-12			2		
		TELETYPEWRITER SET AN/FGC-20					
		TELETYPEWRITER SET AN/FGC-20: (BASIC COMPONENT)		NX	1		
5815-500-4384		POWER SUPPLY PP-978/FG: (mounted in TT-100/FG)		NX	1		
5815-503-2621		TABLE, TELETYPEWRITER FN-59/FG		NX	1		
5815-503-2763		TELETYPEWRITER TT-100/FG; TT-100-B/FG		NX	1		
		TELETYPEWRITER SET AN/FGC-20X AND TELETYPEWRITER SET AN/UGC-4					
		TELETYPEWRITER SET AN/FGC-20X: (BASIC COMPONENT)		NX	1		
		TELETYPEWRITER SET AN/UGC-4: (BASIC COMPONENT)		NX	1		
5815-500-4384		POWER SUPPLY PP-978/FG: (mounted in TT-98/FG)		NX	1		
5815-503-2621		TABLE, TELETYPEWRITER FN-59/FG		NX	1		
5815-503-2764		TELETYPEWRITER TT-98/FG, TT-98A,B,C/FG		NX	1		

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
						FIGURE NO.	ITEM NO.
		AN/FGC-20 (continued)					
		RUNNING SPARE ITEMS					
		AN/FGC-20, AN/FGC-20X, AN/UGC-4, AN/FGC-21, and AN/FGC-66. No parts authorized at operator's level.					
		POWER SUPPLY PP-978/FG					
5920-043-2641		FUSE, CARTRIDGE: 1/4 amp; Littelfuse Cat No. 312.250 (1 r/s mtd in spare fuseholder)			6	4	
		TELETYPEWRITERS TT-98/FG, TT-98A,B,C/FG; TT-99/FG; TT-100/FG, TT-100B/FG; TT-300/FG					
5920-229-1312		FUSE, CARTRIDGE: 1/16 amp; MIL type F02GR062B; (1 r/s mtd fuse clip on xmtr cont cover)			6	4	5
5920-228-7882		FUSE, CARTRIDGE: 2 amp; MIL type F02D2R00B; (1 r/s mtd in fuse clip on xmtr cont cover)			6	4	6
6240-143-3084		LAMP, INCANDESCENT: GE part 15T7/DC; (mtd in spare lampholder in cover)			1	4	3
7530-281-2694		PAPER, RECORDING: Fed Spec UU-P-547d, type 1, class 1, grade A	r1		1	4	1
7510-511-6690		RIBBON, PRINTING, TELETYPEWRITER: Fed Spec DDD-R-311d, type 1, class 1			1	4	2

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
						FIGURE NO.	ITEM NO.
		AN/FGC-20 (continued)					
		TELETYPEWRITER SET AN/FGC-21					
		TELETYPEWRITER SET AN/FGC-21: (BASIC COMPONENT)			1		
5815-500-4384		POWER SUPPLY PP-978/FG: (mounted in TT-99/FG)		NX	1		
5815-503-2621		TABLE, TELETYPEWRITER FN-59/FG		NX	1		
5815-503-2765		TELETYPEWRITER TT-99/FG		NX	1		
		TELETYPEWRITER TT-99/FG: (BASIC COMPONENT)		NX	1		
		TELETYPEWRITER SET AN/FGC-66					
		TELETYPEWRITER SET AN/FGC-66: (BASIC COMPONENT)		NX	1		
5815-500-4384		POWER SUPPLY PP-978/FG: (mounted in TT-300/FG)		NX	1		
5815-816-6303		TELETYPEWRITER TT-300/FG		NX	1		
		NOTE: These parts common to AN/FGC-20, AN/FGC-20X, AN/UGC-4, AN/FGC-21, AN/FGC-66					
7510-511-6690		RIBBON, PRINTING, TELETYPEWRITER: Fed Spec DDD-R-311d, type 1, class 1			1	4	2
5815- 356-3371		SHAFT, ASSEMBLY: Kleinschmidt p/n 50605A (Installed in equip)			1	11	
5815-356-3227		SPOOL, PRINTING, RIBBON: Kleinschmidt p/n 10900 (Installed in equip)			1		
5815-663-3066		CRANK, HAND: Kleinschmidt p/n 54960A			1	5	
5815-203-1678		GEAR WORM: (60 wpm) Sig dwg No. SC-B-69681 (Installed in equip)			1		50350
5815-203-1327		GEAR WORM: (100 wpm) Sig dwg No. SC-B-70482 (mounted in equip)			1		50596
5815-378-5593		GEAR, WORM WHEEL: (60 wpm) Sig dwg No. SC-B-70492 (Installed in equip)			1		50352A
5815-351-7944		GEAR, WORM WHEEL: (100 wpm) Sig dwg No. SC-B-70478			1		50597A
7530-281-2694		PAPER, RECORDING: Fed Spec UU-P-547d, type 1, class 1, grade A			1	4	1

AMSEL-MR Form 1 Dec 64 6010 (Supersedes SELMS-6 (TF))

Army-Ft Monmouth, NJ-MON 5727-64

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
						FIGURE NO.	ITEM NO.
5815-688-8761		TELEPRINTER TT-259/FG: fixed station; receive only; English characters, 72 per line, friction or sprocket feed; sync motor, ac, 110 v, 60 cyc, single ph; 368 and 600 opm; 7.42 unit code					
		ITEMS COMPRISING AN OPERABLE EQUIPMENT					
		TELEPRINTER TT-259/FG: (BASIC COMPONENT)		NX	1		
ORD THRU AGC		TECHNICAL MANUAL TM 11-5815-200-12			2		
5815-663-3066		CRANK, HAND: Kleinschmidt p/n 54960A			1	5	
5815-203-1678		GEAR WORM: (60 wpm); Sig dwg No. SC-B-69681 (Installed in equip)			1		50350
5815-203-1327		GEAR WORM: (100 wpm); Sig dwg No. SC-B-70482 (mounted in equip)			1		50596
5815-378-5593		GEAR, WORM WHEEL: (60 wpm); Sig dwg No. SC-B-70492 (Installed in equip)			1		50352A
5815-351-7944		GEAR, WORM WHEEL: (100 wpm); Sig dwg No. SC-B-70488 (mounted in equip)			1		50597A
7350-281-2694		PAPER, RECORDING: Fed Spec UU-P-547d, type 1, class 1, grade A	rl		1	4	1
7510-511-6690		RIBBON, PRINTING, TELETYPEWRITER: Fed Spec DDD-R-311d, type 1, class 1			1	4	2
5815-356-3371		SHAFT, ASSEMBLY: Kleinschmidt part 50605A (Installed in equip)			1	11	
5815-356-3227		SPOOL, PRINTING, RIBBON: Kleinschmidt p/n 10900 (Installed in equip)			1		
		RUNNING SPARES AND ACCESSORY ITEMS					
		TELEPRINTER TT-259/FG					
5920-229-1312		FUSE, CARTRIDGE: 1/16 amp; MIL type FO2GR062B			5	4	5
5920-581-4144		FUSE, CARTRIDGE: 2 amp; 250 v; Buss p/n MDX2			5	4	6
6240-143-3084		LAMP, INCANDESCENT: GE p/n 15T7/DC; (mtd in spare lampholder in cover)			1	4	3
7530-281-2694		PAPER, RECORDING: Fed Spec UU-P-547d, type 1, class 1, Grade A	rl		1	4	1
7510-511-6690		RIBBON, PRINTING, TELETYPEWRITER: Fed Spec DDD-R-311d, type 1, class 1			1	4	2

APPENDIX III

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance category.

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) are listed in disassembly order or alphabetical order.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the categories.

(*a*) *Service.* To clean, to preserve, and to replenish lubricants.

(*b*) *Adjust.* To regulate periodically to prevent malfunction.

(*c*) *Inspect.* To verify serviceability and detect incipient electrical or mechanical failure by scrutiny.

(*d*) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(*e*) *Replace.* To substitute serviceable components, assemblies, or subassemblies, for unserviceable components, assemblies, or subassemblies.

(*f*) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

(*g*) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(*h*) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(*i*) *Overhaul.* To restore an item to *completely serviceable* condition as prescribed by serviceability standards developed. This is accomplished through employment of the technique of "inspect and repair only as necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(*j*) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintence technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(3) *Operator, organizational, direct support, general support, and depot.* The symbol X indicates the categories responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Categories higher than those marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *Operator, organizational, direct support, general support, and depot.* The dagger (†) symbol indicates the categories normally allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including general support are authorized to the organization operating this equipment.

SECTION II. MAINTENANCE ALLOCATION CHART (AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/FGC-66, AN/UGC-4)

PART OR COMPONENT	MAINTENANCE FUNCTION	MAINTENANCE CATEGORY O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
TELETYPEWRITER SET AN/FGC-20; AN/FGC-20X; AN/FGC-21; AN/FGC-66; AN/UGC-4	service	X						External parts
	adjust	X		X			4	Interior parts Performs rangefinder adjustments
	inspect	X		X			4,5	All adjustments Exterior of all components
	test	X		X			4,5	Interior of all components Operational test
				X			1,4,5	Performs resistance, voltage and current measurements to determine condition of circuits and tests system line-up distortion tests
					X		1,2,3,4,5	Conducts all tests to insure equipment returned to float meets minimum mechanical, visual, electrical and operational requirements
	repair			X			4,5	
	overhaul				X		4,5	
POWER SUPPLY PP-978/FG	repair			X			4,5	
	overhaul				X		4,5	
TELETYPEWRITERS TT-98/FG, TT-98A,B,C/FG; TT-99/FG; TT-100/FG, TT-100B/FG; TT-300/FG	repair			X			4,5	
	rebuild					X	4,5	
	overhaul				X		4,5	
MOTOR ALTERNATING CURRENT	replace			X			4,5	
	repair				X		4,5	
	overhaul				X		4,5	

ANSEL-NR Form 6031 1 Feb 65

EDC-FM 847-65

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS (AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/FGC-66, AN/UGC-4)

Tools required for maintenance functions	Maintenance category					Tool code	Remarks
	O/C	O	DS	GS	D		
AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/FGC-66, AN/UGC-4—Continued							
TEST SET TTY AN/UGM-1	----	----	†	†	†	1	
MULTIMETER TS-352/U	----	----	†	†	†	2	
TELETYPEWRITER TEST SET AN/GGM-1	----	----	----	†	†	3	
TOOL EQUIPMENT TE-50B	----	----	†	†	†	4	
TOOL EQUIPMENT TE-111	----	----	†	†	†	5	

SECTION IV. MAINTENANCE ALLOCATION CHART (TT-259/FG)

PART OR COMPONENT	MAINTENANCE FUNCTION	MAINTENANCE CATEGORY O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
TELEPRINTER TT-259/FG	service	X		X			3	External parts Interior parts
	adjust	X		X			2,3,4	Performs rangefinder adjustments All adjustments
	inspect	X		X			3,4	Exterior parts Interior parts
	test	X		X			1,3,4,	Operational test (receiving) Performs resistance, voltage and current measurements to determine condition of circuits, conducts distortion tests
					X		1,2,3,4	Conducts all tests to insure equipment returned to float meets minimum mechanical, visual, electrical and operational requirements.
	repair			X			3,4	
	rebuild					X	3,4	
	overhaul				X		3,4	
MOTOR, ALTERNATING CURRENT	replace			X			3	
	repair				X		3,4	
	overhaul				X		3,4	

SECTION V. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS (TT-259/FG)

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY O/C	O	DS	GS	D	TOOL CODE	REMARKS
TT-259/FG (continued)							
TEST SET TTY AN/UGM-1			†	†	†	1	
MULTIMETER TS-352/U			†	†	†	2	
TOOL EQUIPMENT TE-50B			†	†	†	3	
TOOL EQUIPMENT TE-111			†	†	†	4	

APPENDIX IV

ORGANIZATIONAL REPAIR PARTS LIST

Section I. INTRODUCTION

1. General

a. This appendix lists the quantities of repair parts authorized for organizational maintenance and constitutes a basis of requisitioning when the major item of equipment is authorized to the organization. These equipments are issued on the basis of allowances prescribed in equipment authorization tables and other documents which are a basis of requisitioning.

b. Columns are as follows:

(1) *Federal stock number.* This column lists the 11-digit Federal stock number.

(2) *Designation by model.* Not used.

(3) *Description.* Nomenclature of the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(4) *Unit of issue.* The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(5) *Expendability.* Nonexpendable items are indicated by NX. Expendable items are not annotated.

(6) *Quantity incorporated in unit.* This column lists the quantity of each part found in a given assembly, component, or equipment.

(7) *Organizational.* The quantities indicated in this column are maximum levels of repair parts authorized to be kept on hand by units performing organizational maintenance. The quantities are based on 100 equipments to be maintained for a 15-day period.

(8) *Illustration.* The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

2. Parts for Maintenance

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide theater communications, those repair parts authorized up to and including general support are authorized for stockage by the organization operating this equipment.

3. Additional Repair Parts Authorization

An asterisk (*) indicates that an item is not authorized for stockage but if required, may be requisitioned for immediate use only.

4. Requisitioning Information

a. The allowance factors are based on 100 equipments. In order to determine the number of parts authorized for the specific number of equipments supported, the following formula will be used and carried out to two decimal places.

$$\text{Specific number of equipments supported} \times \frac{\text{allowance factor}}{100} = \text{number of parts authorized.}$$

b. Fractional values obtained from above computation will be rounded to whole numbers as follows:

(1) When the total number of parts authorized is less than one, the quantity authorized will be one.

(2) For all values above one, fractional values below 0.5 will revert to the next lower number, fractional values of 0.5 or larger will advance to the next higher whole number.

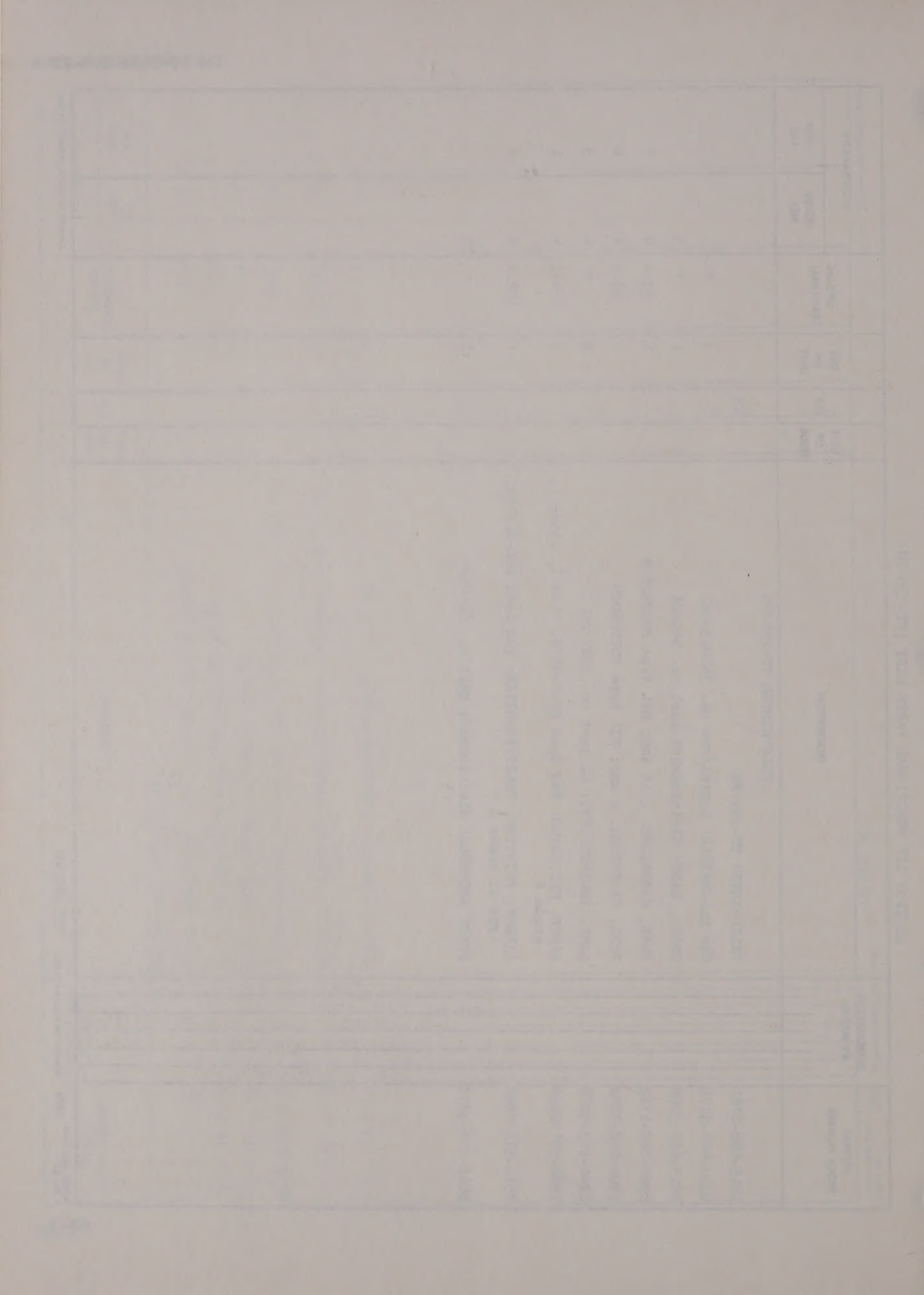
c. The number of parts authorized, determined after application of *a* and *b* above, represent one prescribed load for a 15-day period. The items and computed quantities thereof must be on hand or on order at all times.

d. Major commanders will determine the number of prescribed loads organizational units will carry. Unit and organizations authorized additional prescribed loads will utilize the formula explained in *a* above but will multiply the number of equipments supported by the number of authorized prescribed loads before completing the formula. Fractional values will be rounded to whole numbers as described above.

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGAN-IZATIONAL	ILLUSTRATION	
							FIGURE NO.	ITEM NO.
5815-503-2652		TELETYPEWRITER SET AN/FGC-20: fixed station std comm keyboard; English characters, 72 per line; friction or sprocket feed; sync motor, ac, 115 v, 368 and 600 opm; 7.42 unit code		NX				
5815-392-7743		TELETYPEWRITER SET AN/FGC-20X: fixed station; std comm keyboard; English characters, 72 per line; friction or sprocket feed & series governed motor ac, 115v, 50/60 cyc, dc, 115v; 368 and 600 opm; 7.42 unit code		NX				
5815-557-5970		TELETYPEWRITER SET AN/UGC-4: Fixed station; std comm keyboard; English characters, 72 per line; friction or sprocket feed; series governed motor ac, 115 v, 50/60 cyc; dc, 115 v; 368 and 600 opm; 7.42 unit code		NX				
5815-503-2653		TELETYPEWRITER SET AN/FGC-21: fixed station weather comm keyboard, weather comm symbols, 76 per line; friction or sprocket feed; sync motor; AC, 115v, 60 cyc; 368 and 600 amp; 7.42 unit code		NX				
5815-817-9277		TELETYPEWRITER SET AN/FGC-66: fixed station; std comm; English characters, 72 per line; series governed motor; removable type basket		NX				
		GROUP I POWER SUPPLY PP-978/FG						
5920-244-5150		CAP, ELECTRICAL: Buss type No. 9435-1/2			1	*		
5920-043-2641		FUSE, CARTRIDGE: 1/4 amp; Littelfuse Cat No. 312.250			1	33.4	4	4
		GROUP II TELETYPEWRITERS TT-98/FG, TT-98A,B,C/FG; TT-99/FG; TT-100/FG, TT-100B/FG; TT-300/FG NOTE: These parts common to AN/FGC-20,AN/FGC-20X, AN/UGC-4, AN/FGC-21, AN/FGC-66.						
5920-283-7178		CAP, ELECTRICAL: Littelfuse No. 342003-SA-2			2	*		
5815-663-3066		CRANK, HAND: Kleinschmidt part no. 54960A			1	*	5	

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGAN-IZATIONAL	ILLUSTRATION	
							FIGURE NO.	ITEM NO.
		AN/FGC-20 (continued)						
5920-229-1312		FUSE, CARTRIDGE: 1/16 amp; MIL type FO2GR062B			1	33.4	4	5
5920-228-7882		FUSE, CARTRIDGE: 2 amp; MIL type FO2D2R00B			1	33.4	4	6
6240-143-3084		LAMP, INCANDESCENT: GE part 15T7/DC			2	*	4	3
7530-281-2694		PAPER, RECORDING: Fed Spec UU-P-547d; type 1, class 1, grade A			1	324.3	4	1
7510-511-6690		RIBBON, PRINTING, TELETYPEWRITER: Fed Spec DDD-R-311d, type 1, class 1			1	182.5	4	2
5815-356-3371		SHAFT ASSEMBLY: Kleinschmidt part no. 50605A			1	*	11	

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGAN-IZATIONAL	ILLUSTRATION	
							FIGURE NO.	ITEM NO.
		TELEPRINTER TT-259/FG						
5815-688-8761		TELEPRINTER TT-259/FG		NX				
5920-665-5176		CAP ELECTRICAL: Littelfuse no. 342003-SA2			3	*		
5815-663-3066		CRANK, HAND: Kleinschmidt part no. 54960A			1	*	5	
5920-229-1312		FUSE, CARTRIDGE: 1/16 amp; MIL type F02GR062B			1	33.4	4	5
5920-228-7882		FUSE, CARTRIDGE: 2 amp; MIL type F02D2R00B			2	56.1	4	6
6240-143-3084		LAMP, INCANDESCENT: GE part no. 15T7/DC			2	*	4	3
7580-281-2694		PAPER, RECORDING: Fed Spec UU-P-547d, type 1, class 1, grade A			1	324.3	4	1
7510-511-6690		RIBBON, PRINTING, TELETYPEWRITER: Fed Spec DDD-R-311d, type 1, class 1			1	182.5	4	2
5815-356-3371		SHAFT ASSEMBLY: Kleinschmidt part no. 50605A			1	*	11	



CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Teletypewriter Sets AN/FGC-20 (fig. 1-1), AN/FGC-20X, AN/FGC-21, AN/FGC-64, AN/FGC-66, AN/FGC-67, AN/FGC-67X, AN/UGC-4, AN/UGC-29, AN/UGC-29X and Teleprinter TT-259/FG. It includes operation and operator's maintenance of the equipment.

b. Official nomenclature followed by (*) is used to indicate all models of the equipment item covered in this manual. Thus, Teletypewriter TT-98(*)/FG represents Teletypewriters TT-98/FG, TT-98A/FG, and TT-98B/FG and Teletypewriter TT-100(*)/FG represents Teletypewriters TT-100/FG and TT-100B/FG.

1-2. Index of Publications

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply bulletins, lubrication orders, and modification work orders which are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Reporting of Equipment Manual Improvements. The direct reporting by the individual user of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvement recommendations. This form will be completed using pencil, pen, or typewriter and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-(NMP)-MA, Fort Monmouth, N.J., 07703.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. The teletypewriter sets provide a means of communication with a typewritten record of the communique. The teletypewriter sets are used to transmit, monitor, and receive messages over direct current (dc) wire lines (fig. 1-2) carrier, or radio systems. Either neutral or polar signals can be applied to the selector magnets without the use of relays or other signal conversion equipment. Any of the equipments may be modified for *receive-only* operation (fig. 1-3) by removing the keyboard and making minor wiring changes.

b. Teleprinter TT-259/FG (fig. 1-4) is used only to monitor or receive messages. The same type signals and signal lines as described in *a* above can be used.

1-5. Technical Characteristics (AN/FGC-20, AN/FGC-20X, AN/FGC-21, AN/FGC-64, AN/FGC-66, AN/FGC-67, AN/FGC-67X, AN/UGC-4, AN/UGC-29, and AN/UGC-29X)

Type of installation	Fixed-station, send and receive by direct wire, carrier, or radio-teletype.

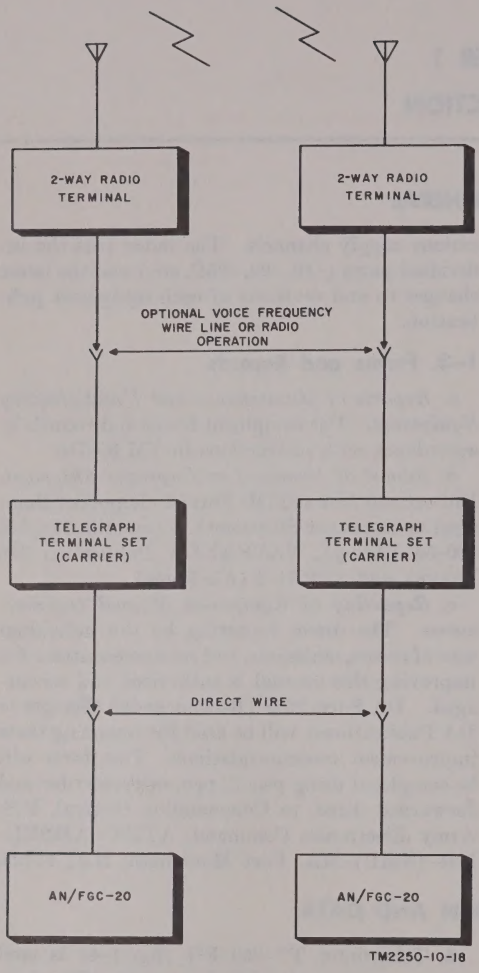


Figure 1–2. System application, block diagram.

Keyboard and typebar symbols:	
Standard	AN/FGC–20, AN/FGC–20X, AN/FGC–66, AN/FGC–67, AN/FGC–67X, AN/UGC–4, AN/UGC–29, and AN/UGC–29X.
Weather	AN/FGC–21 and AN/FGC–64.
Type of characters	English.
Characters per line	Standard, 72; weather, 76.
Type of paper feed	Friction or sprocket.
Signaling:	
Transmission:	
AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–66, and AN/UGC–4.	7.42, start-stop, 5-unit code.
AN/FGC–64, AN/FGC–67, AN/FGC–67X, AN/UGC–29 and AN/FGC–29X.	8.00, start-stop, 5-unit code (includes 2 stop impulses).
Reception	All models receive 7.00, 7.42, and 8.00 start-stop, 5-unit code impulses within acceptable range limits when appropriate gearset is installed to match baud rate in use on signal line.
Type of signals	Neutral (20 or 60 ma); polar (20 or 30 ma).
Operational speeds:	
45.5-baud rate (368.1-opm gearset installed [1]).	61.5 wpm with 7.42-unit code; 56.9 wpm with 8.00-unit code.
50-baud rate (404-opm gearset installed [2]).	67.7 wpm with 7.42-unit code; 62.4 wpm with 8.00-unit code.
56.8-baud rate (460-opm gearset installed [3]).	75 wpm with 7.42-unit code; 70 wpm with 8.00-unit code.
75-baud rate (600-opm gearset installed [4]).	100 wpm with 7.42-unit code; 93.6 wpm with 8.00-unit code.
Code impulse lengths:	
45.5-baud rate	22 milliseconds.
50-baud rate	20 milliseconds.
56.8-baud rate	17.6 milliseconds.
75-baud rate	13.5 milliseconds.
Power requirements:	
AN/FGC–20X, AN/FGC–64, AN/FGC–66, AN/FGC–67X, AN/UGC–4 and AN/UGC–29X.	Approx 180 watts: 95–125 v, 190–250 v, 50–60 cps, ac.
AN/FGC–20, AN/FGC–21, AN/FGC–67 and AN/UGC–29.	Approx 150 watts; 95–125 v, 190–250 v, 60 cps, regulated ac.
TT-259/FG	Approx 120 watts: 95–125 v, 60 cps regulated ac.
Motor type	See paragraph 1–14.
Motor speed	3,600 revolutions per minute.
Motor voltage requirements:	
Series-governed	105- to 125-volt, regulated or unregulated, ac.
Synchronous	105- to 125-volt, 60 cps single phase, ac.

See footnotes on page 1–3.

Paper capacity	Adjustable to accommodate standard 1- through 6-copy, roll, fanfold paper, or sprocket-fed forms, 8½ in. wide.
Signal bias tolerances:	
Transmitted signals	5% maximum.
Received signals (tolerance), 7.42, 5-unit code:	
368.1 or 404 opm	40% marking or spacing bias.
600 opm	35% marking or spacing bias.
End distortion tolerance (received signals), 7.42, 5-unit code:	
368.1 or 404 opm	35% marking or spacing and distortion.
600 opm	30% marking or spacing end distortion.
Range adjustment	Scale calibrated 0 to 120; 100 scale units equal width of 1 unit signal pulse (22 milliseconds at 368.1 opm).
Suppression of interference with radio reception.	Teletypewriter does not interfere with radio reception at frequencies between .35 and 150 mc when located 1 ft or more from radio antenna.
Safety shielding	Points at which potentials of 30 volts or more exist are shielded against accidental contact by personnel.
Surrounding temperature limits:	
Equipment in use	32° F. (0° C.) to 132° F. (55.6° C.)
Equipment in storage	—80° F. (—62.2° C.) to 160° F. (71.1° C.).
Minimum barometric pressure (operating).	16.88 inches of mercury (equivalent to approx. 15,000-ft altitude).
Miscellaneous	Equipment withstands high humidity and moisture as encountered in tropics; is fungiproofed and resistant to corrosion.

[1] Furnished as part of all models except AN/FGC–64.
[2] Furnished as part of AN/FGC–64 only.
[3] Must be requisitioned separately. Not furnished as part of any model of equipment.
[4] Furnished as part of all models.

1–6. Technical Characteristics (TT–259/FG)

Type of installation	Fixed-station; receive, by direct wire, carrier, or radio-teletype.
Type bar symbols	Standard.
Type of characters	English.
Characters per line	72.
Type of paper feed	Friction or sprocket.
Signaling code	Five-unit, start-stop.
Type of signals	Neutral (20 or 60 ma); polar (20 or 30 ma).

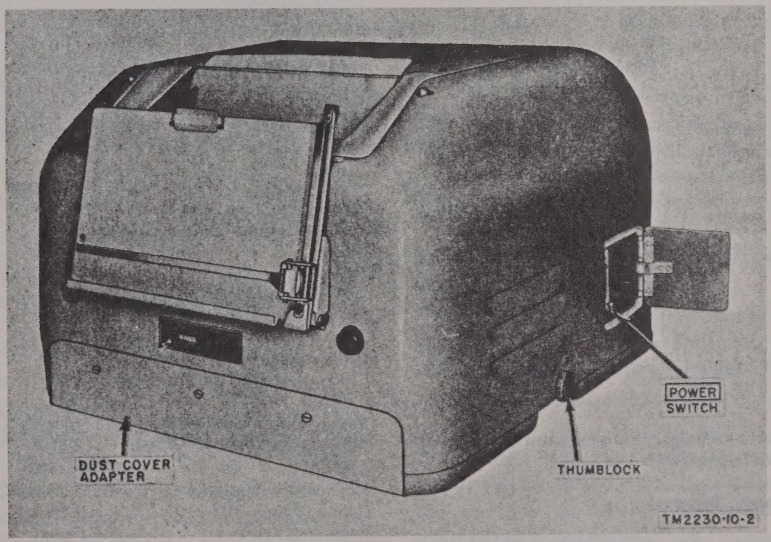


Figure 1–3. Teletypewriter TT–98/FG, keyboard removed.

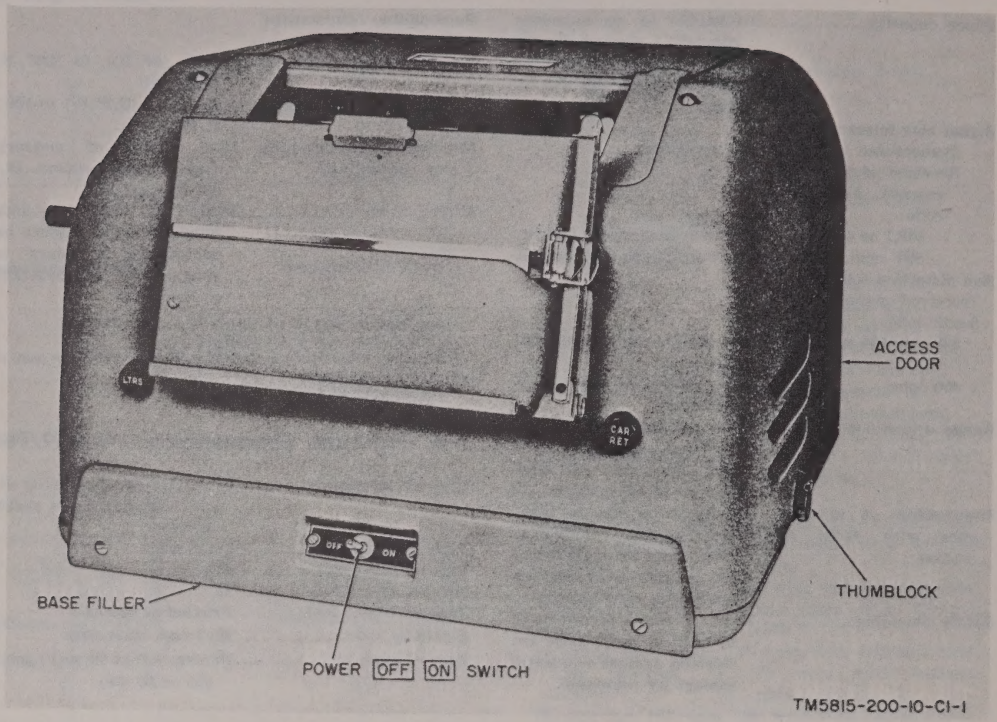


Figure 1–4. Teleprinter TT–259/FG.

Speed:	368.1, 404, 460, or 600 opm.
Operations per minute.	
Words per minute	60, 66, 75, or 100 wpm.
Power requirements	Approx 120 watts.
Motor type	Synchronous.
Motor speed	3,600 rpm.
Motor voltage requirements.	105- to 125-volt, 60-cps, single phase, ac.
Paper capacity	Adjustable to accommodate standard 1- through 6-copy, roll, fanfold paper, or sprocket-fed forms, 8½ in. wide.
Total weight of installed equipment with full roll of paper.	Approx 48 lb.

Note. All other technical characteristics are identical with those listed in paragraph 1–5.

1–7. Common Names

Common names have been assigned to the items listed below.

Item	Common name
Teletypewriter Set AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64, AN/FGC–66, AN/FGC–67, AN/FGC–67X, AN/UGC–4, AN/UGC–29, and AN/UGC–29X.	Teletypewriter set.
Teletypewriter TT–98/FG, TT–98A/FG, TT–98B/FG, TT–98C/FG, TT–99/FG, TT–100/FG, TT–100B/FG, TT–293/FG, TT–300/FG, TT–482/UGC, and TT–483/UGC.	Teletypewriter.
Power Supply PP–978/FG	Power supply.
Teletypewriter Table FN–59/FG.	Table.
Keyboard transmitter	Keyboard.
Inking ribbon	Ribbon.
Recording paper	Paper.
Rangefinder dial assembly	Rangefinder.

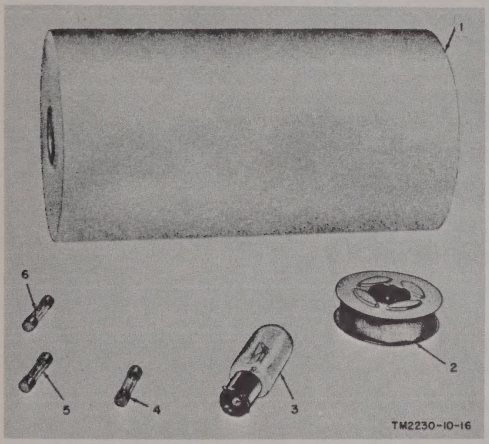
1–8. Components Data

a. Components. Refer to appendix II for the official listing of components.

b. Size and Weight of Major Components. The following chart lists the dimensions and weight of the major components.

Item	Height (in.)	Depth (in.)	Width (in.)	Unit weight (lb)
Teletypewriter	11¼	20$^{9}/_{16}$	17⅛	54
Power supply	4	4	9	7
Table	27	22¼	18¾	22
TT–259/FG	11¼	16¾	17⅛	44

C. Running Spares (fig. 1–5). Running spares are listed in appendix II.



1 Recording paper
2 Inking ribbon and spool
3 Lamp, incandescent
4 Fuse, ¼-ampere, 250-volt
5 Fuse, $^{1}/_{10}$-ampere, 250-volt
6 Fuse, 2-ampere, 250-volt

Figure 1–5. Running spares.

1–9. Description of Teletypewriter Set (fig. 1–1)

a. The teletypewriter set includes a page printer, a keyboard transmitter, and a power supply. In addition, AN/FGC–20, AN/FGC–20X, AN/FGC–21, AN/FGC–64, AN/FGC–67, and AN/FGC–67X are supplied with a table.

b. A dust cover is placed over the teletypewriter to protect the operating mechanism from dust or dirt. The dust cover, table, and exterior portions of the set are painted gray.

1–10. Description of Teletypewriter (fig. 1–6)

a. A keyboard is mounted in front of and below the dust cover. The TT–98(*)/FG, TT–100/FG, TT–300/FG, TT482/UGC, and TT–483/UGC have a standard communications keyboard with square, gray keytops; the TT–99/FG and TT–293/FG have a weather communications keyboard with black round keytops. A keyboard guard is mounted around the front of the keyboard. Four control switches are mounted in the keyboard guard, two on each side of the guard.

b. The teletypewriter dust cover has three access doors that make it possible to replenish the paper supply and change the ribbon, adjust the range, and operate the POWER switch. Two pushbuttons protrude through the front of the dust cover. A copyholder, mounted on the front of the dust cover, holds the copy in line for easy vision of the operator.

1–11. Description of TT–259/FG (fig. 1–4)

a. The TT–259/FG is a *receive only* teletypewriter. It is equipped with standard communication symbols and a synchronous motor. The only control is a power switch located on the front of the unit.

b. The dust cover has three access doors that make it possible to replenish the paper supply and change the ribbon, adjust the range, and replace the two input fuses. Two pushbuttons protrude through the front of the dust cover.

1–12. Description of Power Supply (fig. 1–7)

The power supply, located at the rear of the teletypewriter, is a plug-in, full-wave rectifier that provides a source of dc for the signal line and local test circuits, and adjusted alternating current (ac) for the ac circuits. Plug-in taps are provided in the primary winding of the input transformer that permit operation with input voltages of 95- to 125- and 190- to 250-volt, 60-cycle ac. Plug-in taps also permit coarse and fine adjustment in the secondary winding.

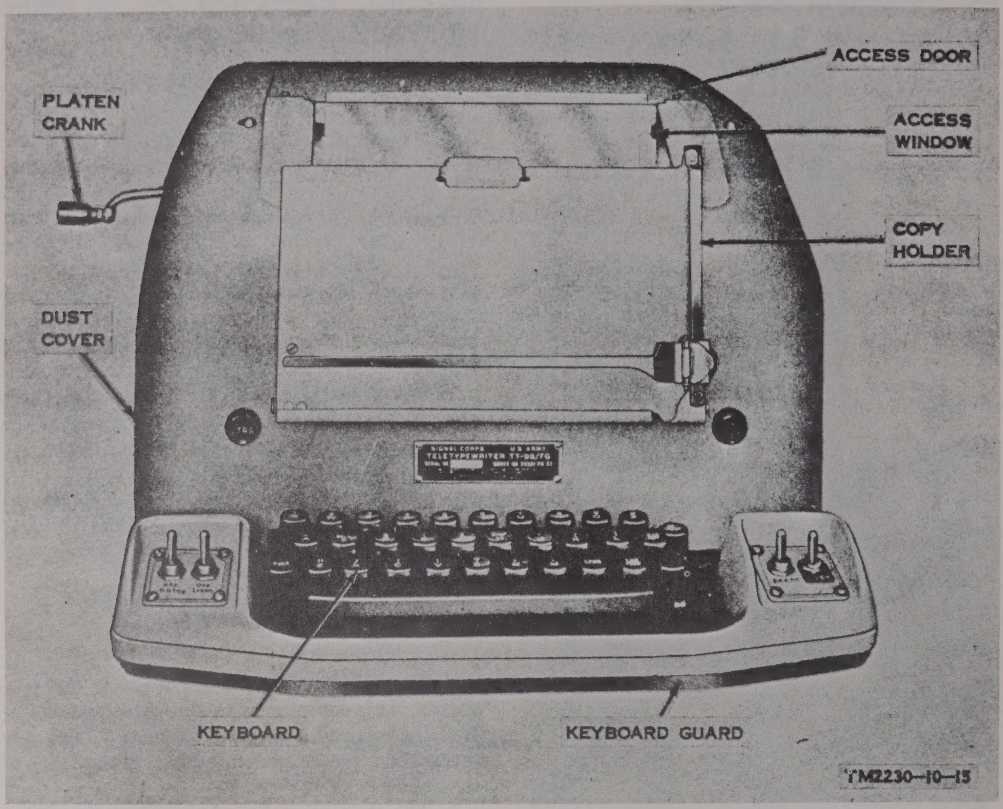


Figure 1-6. Teletypewriter TT-98(*)/FG.

1-13. Description of Table

(fig. 1-8)

a. The table is constructed so that the teletypewriter can be mounted at a height convenient to the seated operator. Except for the composition top, it is of metallic construction. Two spring-loaded guide pins are mounted in the table top to locate the teletypewriter on the table.

b. A fanfold form rack is provided in the table. Fanfold forms are placed in the rack, and the top form is threaded through the guide chute and slot provided in the table top and into the teletypewriter.

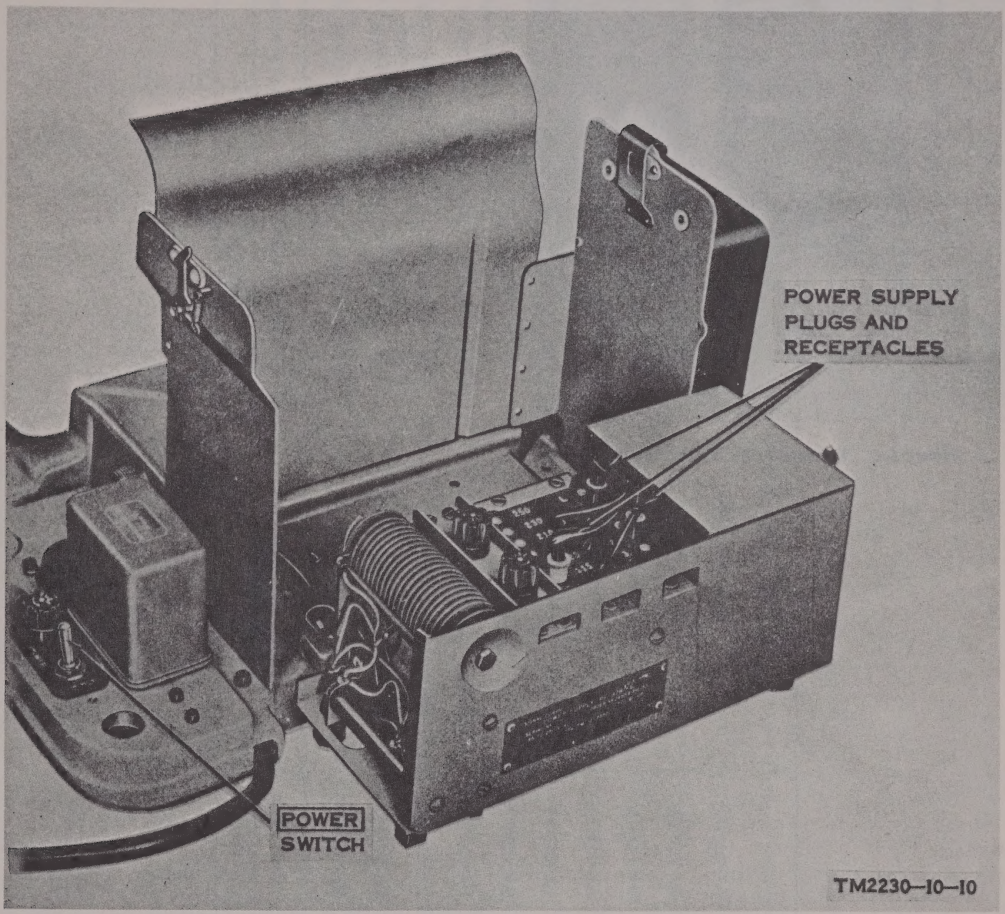


Figure 1-7. Power Supply PP-978/FG.

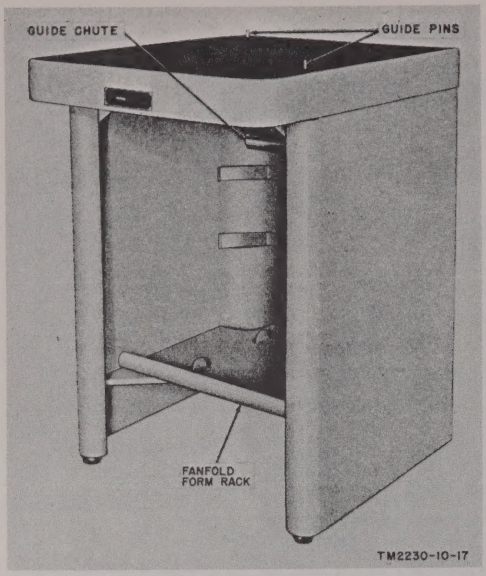


Figure 1-8. Teletypewriter Table FN-59/FG.

1-14. Differences in Models

The major functional differences between models of the basic equipment are covered in the following chart.

Teletypewriter set	Major components			Major features			
	Teletypewriter	Power supply	Table	Motor type	Code transmitted	Type of symbols	Capsule description of set
AN/FGC–20	TT–100(*)/FG	PP–978/FG	FN–59/FG	Synchronous	7. 42	Standard	Basic teletypewriter for use with regulated power sources.
AN/FGC–20X	TT–98(*)/FG	PP–978/FG	FN–59/FG	Series-governed	7. 42	Standard	Basic teletypewriter for use with unregulated power sources.
AN/FGC–21	TT–99/FG	PP–978/FG	FN–59/FG	Synchronous	7. 42	Weather	Identical to AN/FGC–20 except for type of symbols.
AN/FGC–64	TT–293/FG	PP–978/FG	FN–59/FG	Series-governed	8. 00	Weather	Identical to AN/FGC–21 except for motor type and 8.00 unit code.
AN/FGC–66	TT–300/FG	PP–978/FG		Series-governed	7. 42	Standard	Identical to AN/UGC–4 except for a readily removable type basket.
AN/FGC–67	TT–482/UGC	PP–978/FG	FN–59/FG	Synchronous	8. 00	Standard	Identical to AN/FGC–64 except for type of symbols and motor.
AN/FGC–67X	TT–483/UGC	PP–978/FG	FN–59/FG	Series-governed	8. 00	Standard	Identical to AN/FGC–64 except for type of symbols.
AN/UGC–4	TT–98(*)/FG	PP–978/FG		Series-governed	7. 42	Standard	Identical to AN/FGC–20X but less the table.
AN/UGC–29	TT–482/UGC	PP–978/FG		Synchronous	8. 00	Standard	Identical to AN/FGC–67 but less the table.
AN/UGC–29X	TT–483/UGC	PP–978/FG		Series-governed	8. 00	Standard	Identical to AN/FGC–67X but less the table.
	TT–259/FG			Synchronous		Standard	Receive only page printer.

CHAPTER 2

INSTALLATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2–1. Unpacking

a. Packaging Data.

(1) When packed for export shipment, each teletypewriter set is packed into two wooden boxes. Pertinent data is given in the following table.

Box No.	Dimensions	Volume (cu ft)	Weight (lb)	Contents
1	19 x 24¾ x 32	8. 2	119	Teletypewriter.
2	30 x 20½ x 24½	8. 7	79	Table.

(2) When packed for domestic shipment, each teletypewriter set is packed into two corrugated cartons. Pertinent data is given in the following table.

Box No.	Dimensions	Volume (cu ft)	Weight (lb)	Contents
1	16½ x 23 x 29	6. 4	61	Teletypewriter.
2	28¾ x 20 x 23⅜	7. 6	22	Table.

b. Unpacking Table, Export Packaging (fig. 2–1).

***Caution:* Be careful when unpacking equipment. Do not thrust tools into the interior of the shipping container; this procedure may damage the equipment.**

(1) Remove the nails from the box cover and remove the cover.

(2) Carefully lift the carton from the wooden box.

(3) Open the carton by slitting three of the edges to permit the fourth edge to act as a hinge.

(4) Remove the liners, the filler, and the table; remove the sealed accessory carton from the kneehole of the table.

c. Unpacking Teletypewriter, Export Packaging (fig. 2–2).

(1) Observe the instructions in the *Caution* notice (*b* above).

(2) Carefully remove the nails from the wooden box cover; *the teletypewriter is attached (upside down) to the wooden box cover.*

(3) Carefully lift the wooden box cover straight up; be careful not to damage the teletypewriter.

(4) Set the wooden box cover and teletypewriter on a suitable working surface.

(5) Carefully cut around the base of the sealed barrier. Remove the sealed barrier.

(6) Remove the dust cover of the teletypewriter by loosening the locking knobs on each side of the base and then lifting the cover straight up.

(7) Remove the hexagonal nut, lock washer, and flat washer (fig. 2–2) from each of the four shock mounts.

(8) Remove the platen crank and the power cord from the power supply of the teletypewriter and replace the dust cover on the teletypewriter. Tighten the locking knobs.

(9) Lift the teletypewriter completely from the shock mounts and place it in position on the table.

d. Unpacking Table, Domestic Packaging.

(1) Observe the instructions in the *Caution* notice (*b* above.)

(2) Open the carton by slitting three of the edges to permit the fourth edge to act as a hinge.

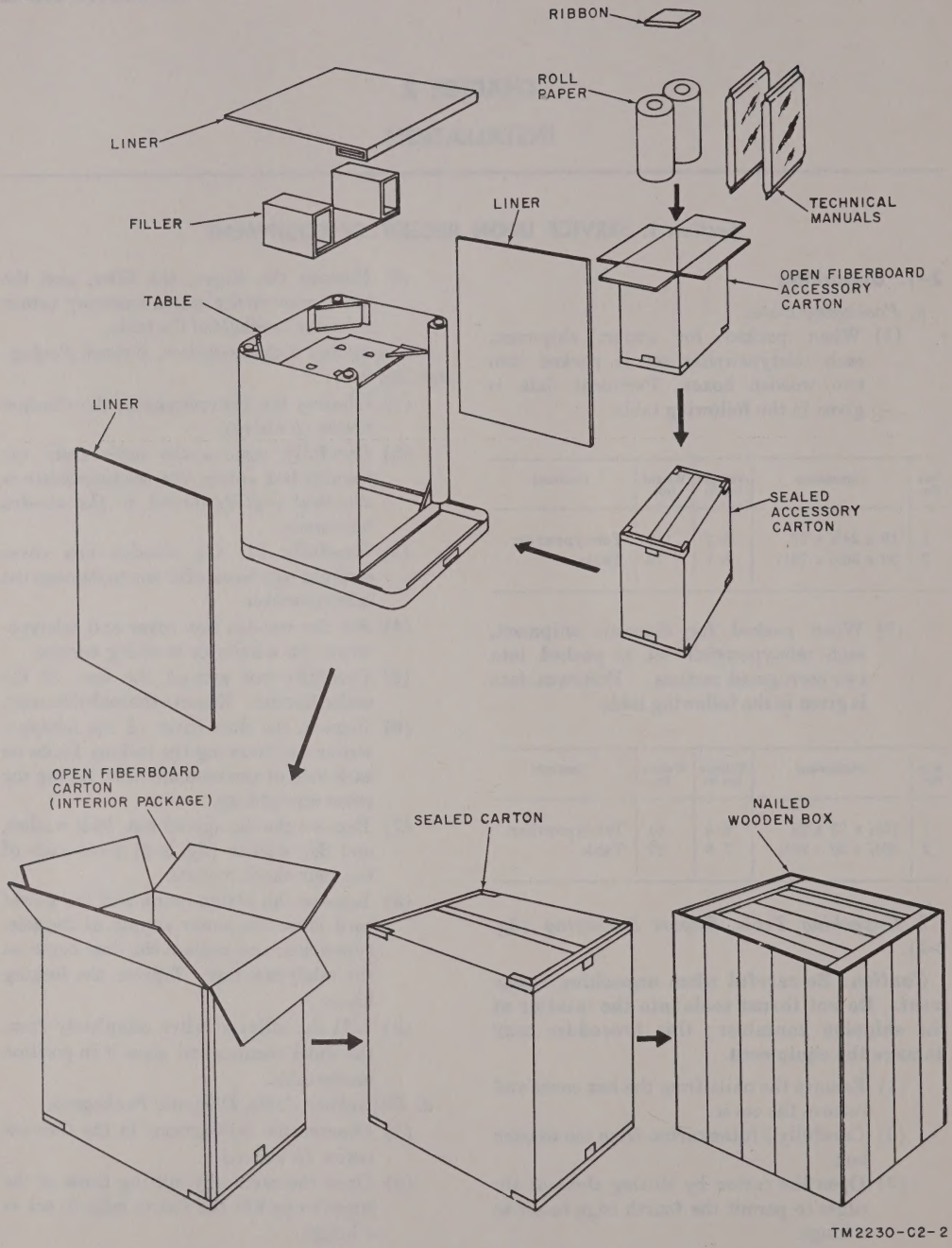


Figure 2-1. Teletypewriter Table FN-59/FG packaged for export shipment.

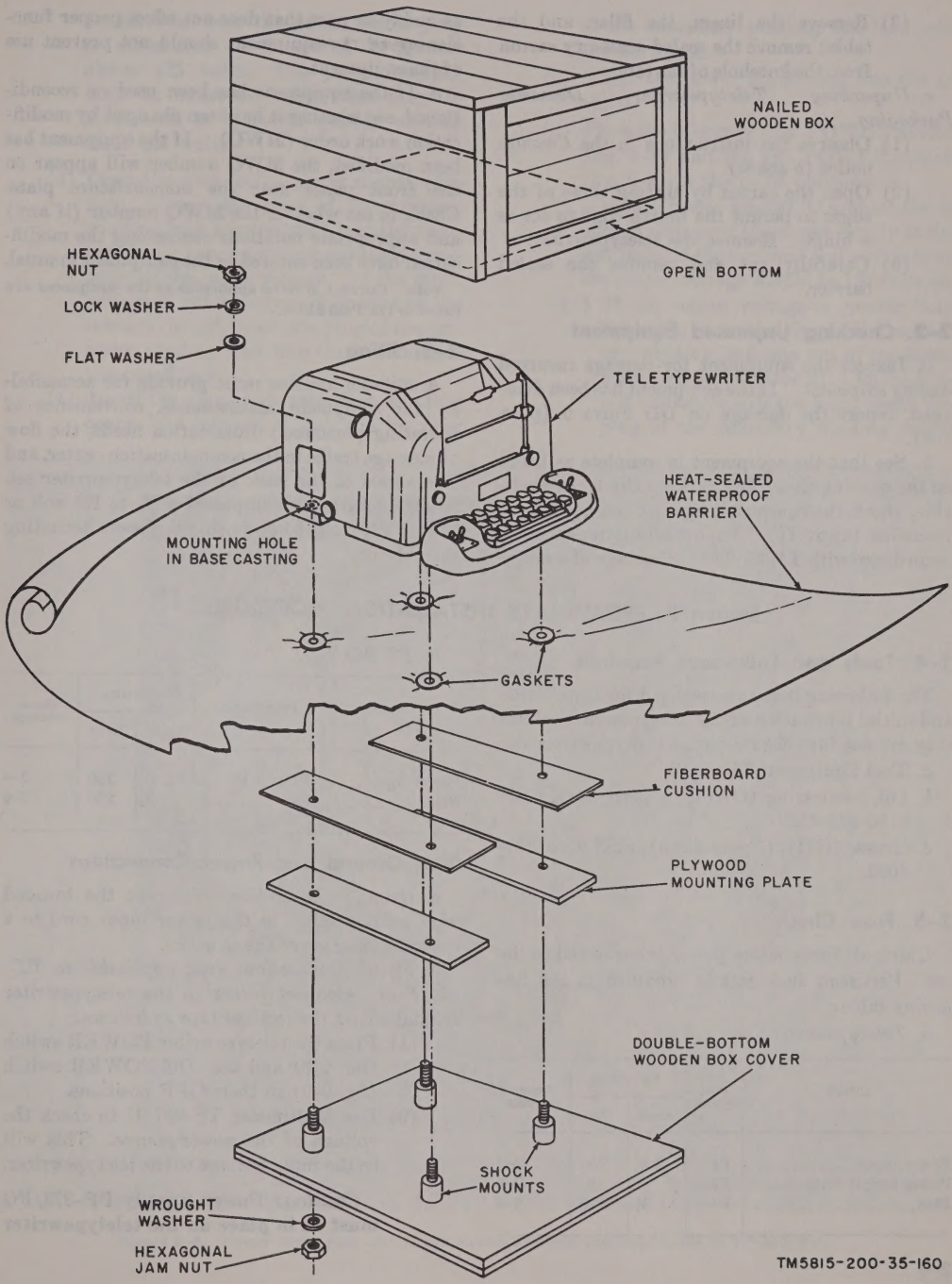


Figure 2-2. Teletypewriter T-98B/FG packaged for export shipment.

(3) Remove the liners, the filler, and the table; remove the sealed accessory carton from the kneehole of the table.

e. Unpacking Teletypewriter, Domestic Packaging.

(1) Observe the instructions in the *Caution* notice (*b* above).

(2) Open the carton by slitting three of the edges to permit the fourth edge to act as a hinge. Remove the teletypewriter.

(3) Carefully cut and remove the sealed barrier.

2–2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 1–3).

b. See that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against the basic issue items list (appx II). Report all discrepancies in accordance with TM 38–750. Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Check to see whether the MWO number (if any) and appropriate notations concerning the modification have been entered in the equipment manual.

Note. Current MWO's applicable to the equipment are listed in DA Pam 310–4.

2–3. Siting

A suitable location must provide for accessibility for equipment maintenance, convenience of operating personnel, illumination needs, the flow of message traffic in the communication center, and free access to the back of the teletypewriter set. Select a location which provides 95- to 125-volt or 190- to 250-volt, 60-cycle single phase alternating current (ac).

Section II. PRELIMINARY INSTALLATION PROCEDURES

2–4. Tools and Lubricants Required

The following items are required for installation and initial lubrication of the teletypewriter set but they are not furnished with the teletypewriter set:

a. Tool Equipment TE–50–B.

b. Oil, lubricating (OAI), (1 quart can), FSN 9150–223–4129.

c. Grease (GH), (1 pound can), FSN 9150–223–4003.

2–5. Fuse Check

Check all fuses before power is connected to the set. Pertinent fuse data is provided in the following table:

a. Teletypewriter Set.

Circuit	Fuse symbol	Fuse rating		Figure reference
		Amps	Volts	
Power input	F1	2. 0	250	2–3
Power supply output	F2	¼	250	2–5
Bias	F4	1/16	250	2–9

b. TT–259/FG.

Circuit	Fuse symbol	Fuse rating		Figure reference
		Amps	Volts	
Power input	F1 and F2	2. 0	250	2–4
Bias	F4	1/16	250	2–9

2–6. Ground and Power Connections

a. Ground Connection. Connect the braided wire lead attached to the power input cord to a grounded portion of the ac outlet.

b. Power Connections (not applicable to TT–259/FG). Connect power to the teletypewriter set and adjust the rectifier taps as follows:

(1) Place the teletypewriter POWER switch (fig. 2–3) and the DC POWER switch (fig. 2–9) in their OFF positions.

(2) Use Multimeter TS–297/U to check the voltage of the power source. This will be the input voltage to the teletypewriter.

***Caution:* Power Supply PP–978/FG must be in place on the teletypewriter**

frame whenever the power input plug is connected to a source of power above 125 volts. The power supply may be removed when the plug is connected to a power supply of less than 125 volts.

(3) Open the door to the power supply (fig. 2-5). Insert the plug of the primary winding lead (center lead) into the numbered jack corresponding, as close as possible, to the input voltage. If the input voltage is not exactly as indicated on the terminal board, insert the plug of the primary winding lead into the next higher numbered jack.

(4) Insert the plug of the secondary winding coarse lead into the M jack and the plug of the secondary winding fine lead into the No. 3 jack.

(5) Insert the power input plug into the ac outlet.

(6) Place the teletypewriter POWER switch (fig. 2-3) and the DC POWER switch (fig. 2-9) in their ON positions.

(7) Use Multimeter TS-297/U to check the dc output voltage of the power supply at the test jacks of the terminal and switch box; the output voltage should be 120 volts dc.

(*a*) If the output voltage is greater than 120 volts, insert the plug of the secondary winding lead into one of the lower numbered jacks (1 or 2). If the output voltage is still too high, insert the plug of the secondary winding coarse

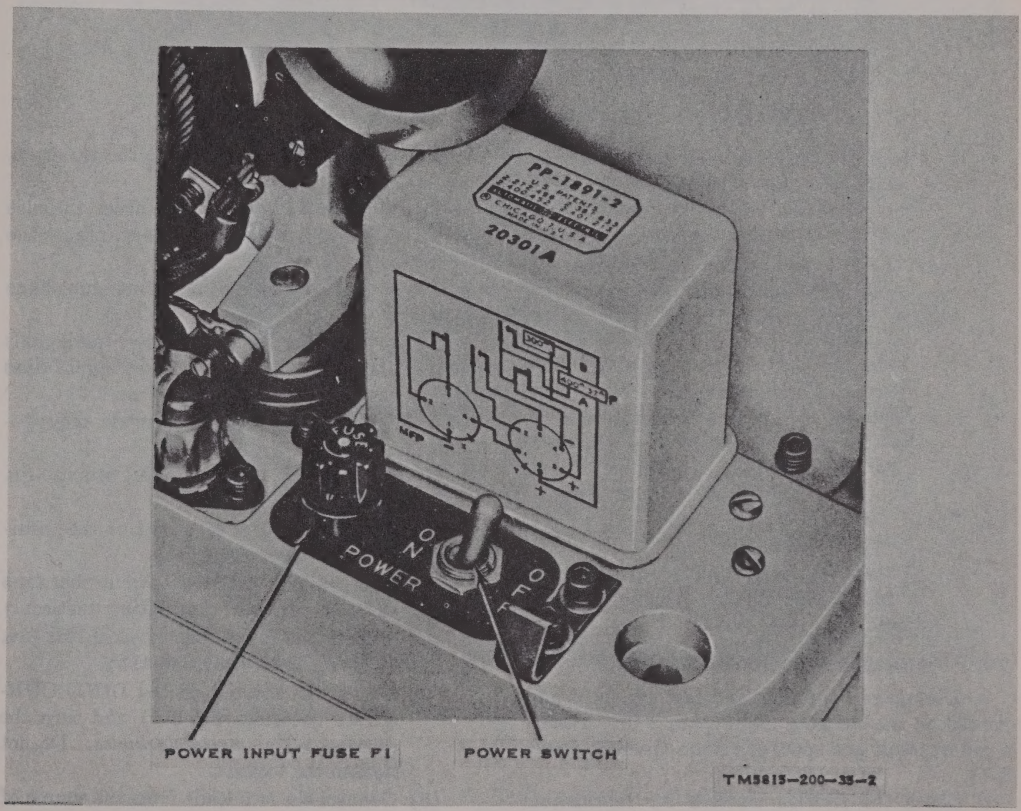


Figure 2-3. Power input fuse and power switch location (not applicable to TT-259/FG).

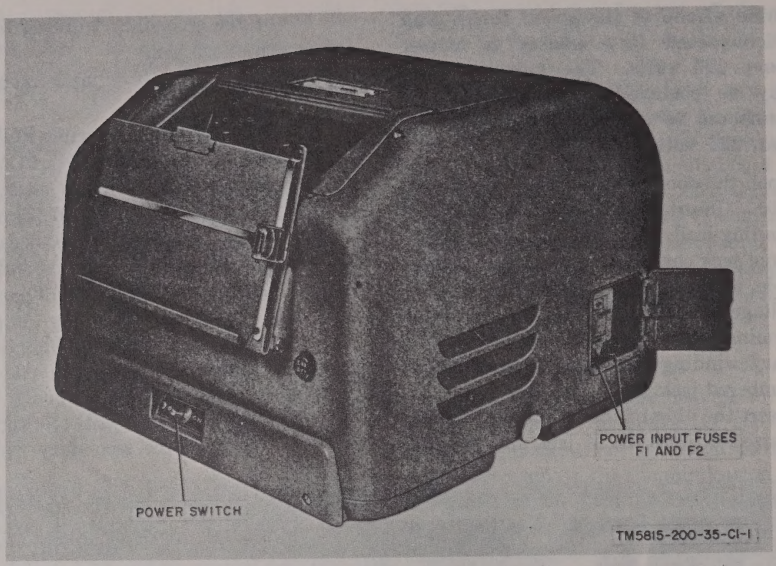


Figure 2-4. Location of power input fuses and power switch (TT-259/FG).

lead into the L jack and insert the plug of the secondary winding fine lead into the numbered jack (1 through 5) that will give the required output voltage.

(*b*) If the output voltage is less than 120 volts, insert the plug of the secondary winding fine lead into one of the higher numbered jacks (4 or 5). If the output voltage is still too low, insert the plug of the secondary winding coarse lead into the H jack and insert the plug of the secondary winding fine lead into the numbered jack (1 through 5) that will give the required output voltage.

c. Power Connection (TT-259/FG).

(1) Set the power switch (fig. 2-4) to OFF.

(2) Connect the power input plug to a source of 105- to 125-volt, 60-cps, single-phase power.

2-7. Preinstallation Checks (TT-259/FG)

a. Disengage the platen and carriage locks and reposition the blocking plate (para 2-8). Install a roll of paper and spool of ribbon (paras 3-6 and 3-7).

b. Check the friction clutches for lubrication (para 2-8). Lubricate, if necessary.

c. Check the speed-control gears; change gears, if necessary (para 2-11).

d. Set the power switch to ON, check the bias current (para 2-13) and, if necessary, adjust the bias resistor.

e. Disconnect the shorting bar from signal line terminals 2 and 3 (fig. 2-9).

f. If a local source of teletypewriter test signals is not available, connect the incoming signal lines and make the final adjustments (para 2-19).

g. If a local source of 60-ma neutral teletypewriter test signals is available:

(1) Set the LINE SELECTOR switch (fig. 2-9) to TEST.

(2) Set the DC POWER switch on the terminal and switch box to ON.

(3) Insert several thicknesses of rubber tape (or other suitable insulating material) between the E contacts of jack J4B (14, fig. 2-67, TM 11-5815-200-35).

(4) Loosen the locknut on the LINE CURRENT rheostat (fig. 2-9) and turn the rheostat fully *counterclockwise.* Do not tighten the locknut.

(5) Connect the two leads from the source of local test signals to signal line terminals

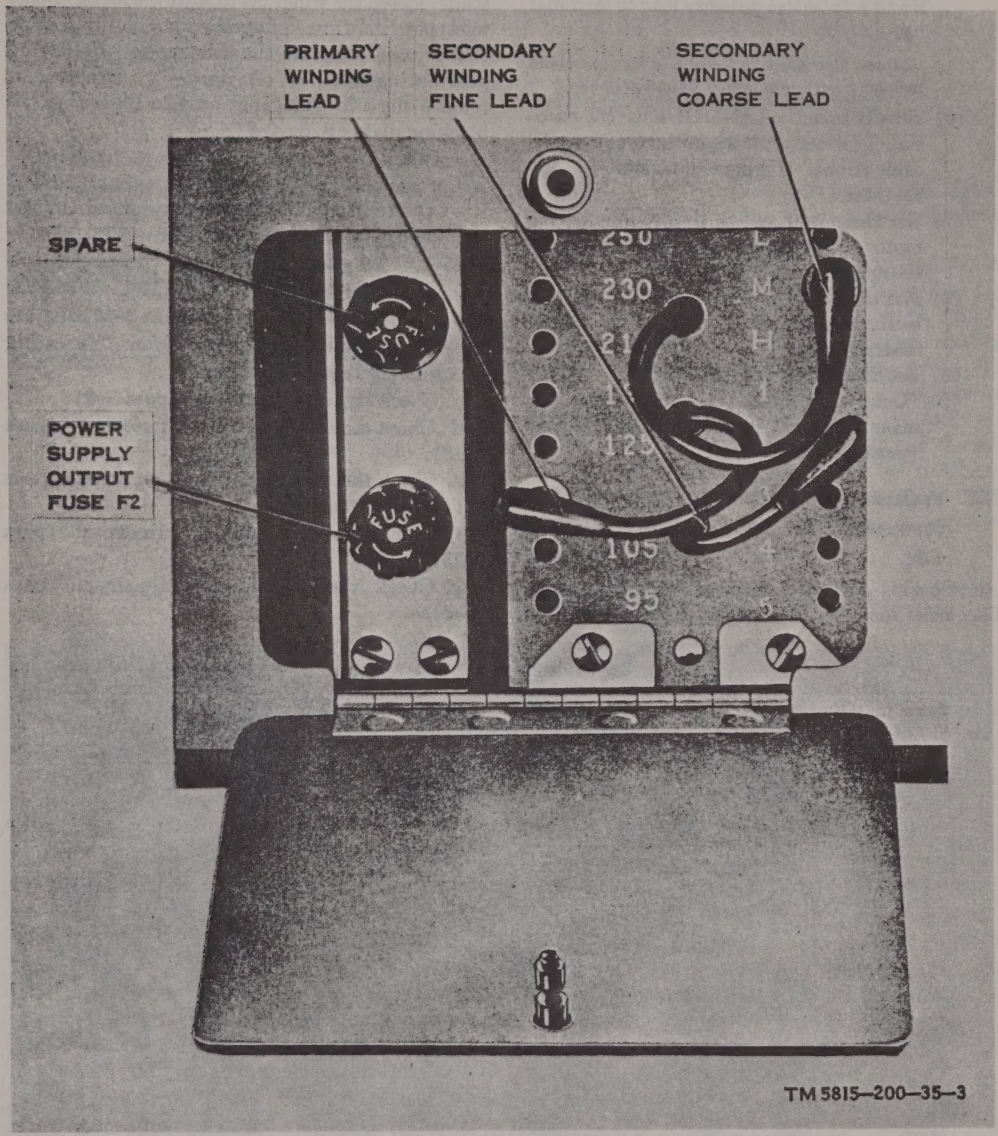


Figure 2-5. Power supply panel (not applicable to TT-259/FG).

2 and 5 (positive polarity lead to terminal 2).

Note. The source of local test signals should include a series-connected dc millammeter.

(6) Slowly turn the LINE CURRENT rheostat clockwise until the milliammeter indicates 60 ma. Tighten the locknut on the rheostat.

(7) Set the power switch to ON to start the motor. Check and, if necessary, adjust the motor speed (para 2–10).

(8) Arrange to have test signals transmitted to the teletypewriter. Adjust the rangefinder (para 2–14).

(9) Set the power switch to OFF.

(10) Connect the incoming signal lines and make the final installation adjustments (para 2–19).

2–8. Preliminary Operating Checks and Adjustments (Not applicable to TT–259/FG).

a. Check platen and carriage locks (fig. 2–6). The locks must be disengaged from the locking studs; loosen the wingnuts to shift the locks. Some teletypewriters are equipped with a blocking plate that is used to secure the carriage return driving gear during shipment (A, fig. 2–7). In this case, remove the two hexagonal nuts to reposition the blocking plate (B, fig. 2–7).

b. Check the friction clutches. If the teletypewriter has been out of service for a long period of time, the friction clutches may have dried out and will require lubrication (paras 2–8—2–12, TM 11–5815–200–35) and readjustment (paras 2–95, 2–127, 2–174, 2–175, and 2–182 in TM 11–5815–200–35). Adjust the motor speed (para 2–10) and the rangefinder dial (para 2–14) before lubricating or adjusting friction clutches.

c. Check switch adjustments (para 2–9).

d. Check motor speed; adjust if necessary (para 2–10).

e. Check the speed-control gears; change gears if necessary (para 2–11).

f. Check the bias current adjustment (para 2–13).

g. Check the rangefinder adjustment (para 2–14).

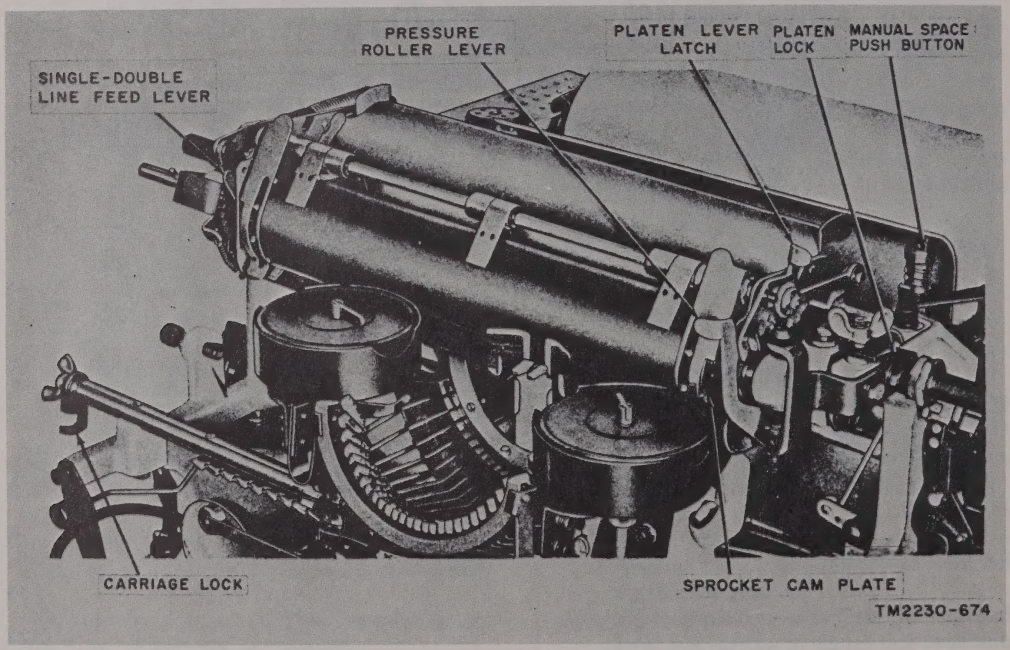
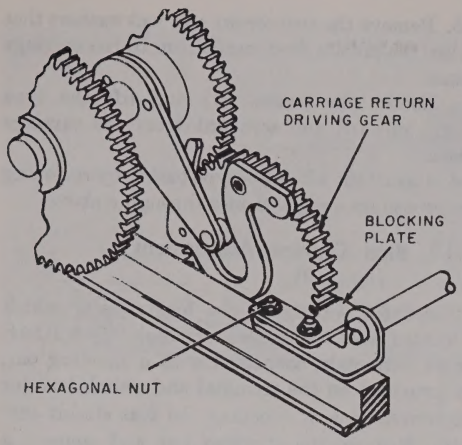
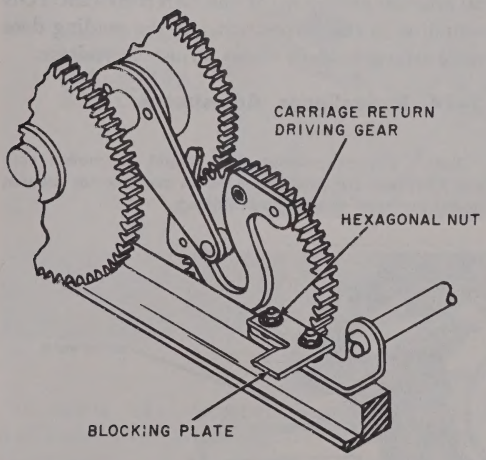


Figure 2–6. Teletypewriter, dust cover removed, showing platen and carriage locks.



A. BLOCKING PLATE IN SHIPPING POSITION



B. BLOCKING PLATE IN OPERATING POSITION

TM5815-200-35-4

Figure 2-7. Carriage return driving gear blocking plate.

2-9. Switch Settings (Not applicable to TT-259/FG)

a. Set the LINE SELECTOR switch, on the terminal and switch box (fig. 2-9), to the TEST position.

b. Set the DC POWER switch to OFF.

c. Set the SEND-LOCK switch, on the keyboard, to the SEND position.

2-10. Motor Speed Adjustment

Adjust the motor speed as follows:

a. Turn the MOTOR switch to ON.

b. Strike a 180 vibrations-per-second (vps) tuning fork gently against the hand to make it vibrate.

c. View the spots on the (rotating) target wheel through the vibrating shutters on the end of the tuning fork. If the spots are stationary, no adjustment is necessary. If the spots are moving clockwise, pull the end of the adjusting worm outward, and hold it out until the clockwise motion of the target spots has stopped. If the spots are moving counterclockwise, push the end of the adjusting worm inward and hold it in until the motion of the target spots has stopped. The motor now is set at its operating speed of 3,600 revolutions per minute (rpm).

2-11. Changing Operating Speed of Teletypewriter

(fig. 2-8)

a. The teletypewriter is shipped by the manufacturer with the 60-word-per-minute (wpm) (368.1-operation-per-minute (opm)) gears installed and the 100-wpm (600 opm) gears supplied as accessory equipment. The accessory gears are mounted on the main shaft drive gear cover plate on the right rear side of the teletypewriter. The speed in operations per minute is stamped on the sides of the main shaft drive gear and on the shank of the motor worm gear.

Note. The AN/FGC-64 includes 45.5-baud rate (368.1 opm) gears which are installed. Fifty-baud rate (404 opm) and 75-baud rate (600 opm) gears are supplied as accessory gears.

b. To change the operating speed of the teletypewriter:

(1) Disconnect the motor plug from the receptacle in the base.

(2) Remove the four socket head screws and lockwashers that secure the gear cover to the frame.

(3) Remove the screws and lockwashers that fasten the motor to the casting and remove the motor.

(4) Remove the screw and lockwasher that secure the motor worm gear to the armature shaft and remove the motor worm gear.
(5) Remove the screw and lockwasher that secure the worm gear to the main shaft and remove the worm gear.
(6) Install the new gears and replace the motor and gear cover.
(7) Check the motor speed (para 2–10) and friction clutch adjustments (paras 2–95, 2–127, 2–174, 2–175, and 2–182, TM 11–5815–200–35).

c. To operate the teletypewriter with British equipment which has an operating speed of 66 wpm, it is necessary to install a new gear set and to readjust the margin bell to ring on the 63d space from the left-hand margin and the right-hand margin stop bar shift stop to permit the printing of 69 characters per line. Obtain a gear set which is designed for 404 opm and install it as described in *b* above. Refer to paragraphs 2–206 and 2–212 (TM 11–5815–200–35) for margin bell and stop bar shift stop adjustment procedures.

2–12. Changing Type Basket of Teletypewriter TT–300/FG

a. Remove the inking ribbon from the ribbon guide.

b. Remove the two screws and lockwashers that secure the ribbon feed mechanism to the carriage frame.

c. Loosen the screws (3) and lift the type basket upward and outward from the carriage frame.

d. Install the alternate type basket by reversing the procedure described in *a* through *c* above.

2–13. Bias Current Adjustment
(fig. 2–9)

Check the setting of the bias resistor which is located near the rangefinder dial. Two BIAS TEST terminals, connected with a shorting bar, are provided on the terminal and switch box for the convenience of checking the bias circuit current. Remove the shorting bar and connect a milliammeter between the two BIAS TEST terminals. Check the current in the bias circuit. The milliammeter should read 12.25 milliamperes (ma) if the LINE SELECTOR switch is in the 60 position or 8.75 ma if the LINE SELECTOR switch is in the 20 position. If the reading does not conform to these values, adjust the resistor.

2–14. Rangefinder Adjustment
(fig. 2–9)

Note. The rangefinder dial should be moved only when signals are being received in the selector magnet and the selector camshaft is rotating.

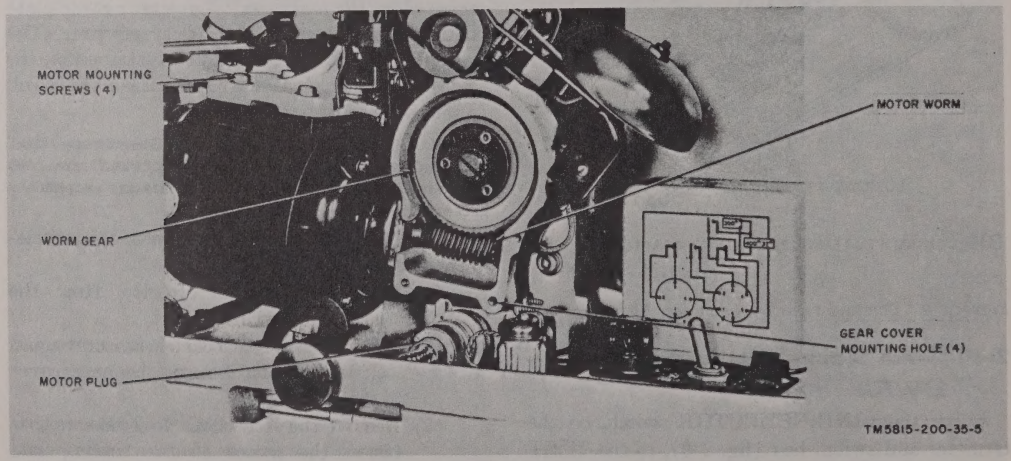


Figure 2–8. Teletypewriter motor and drive gears.

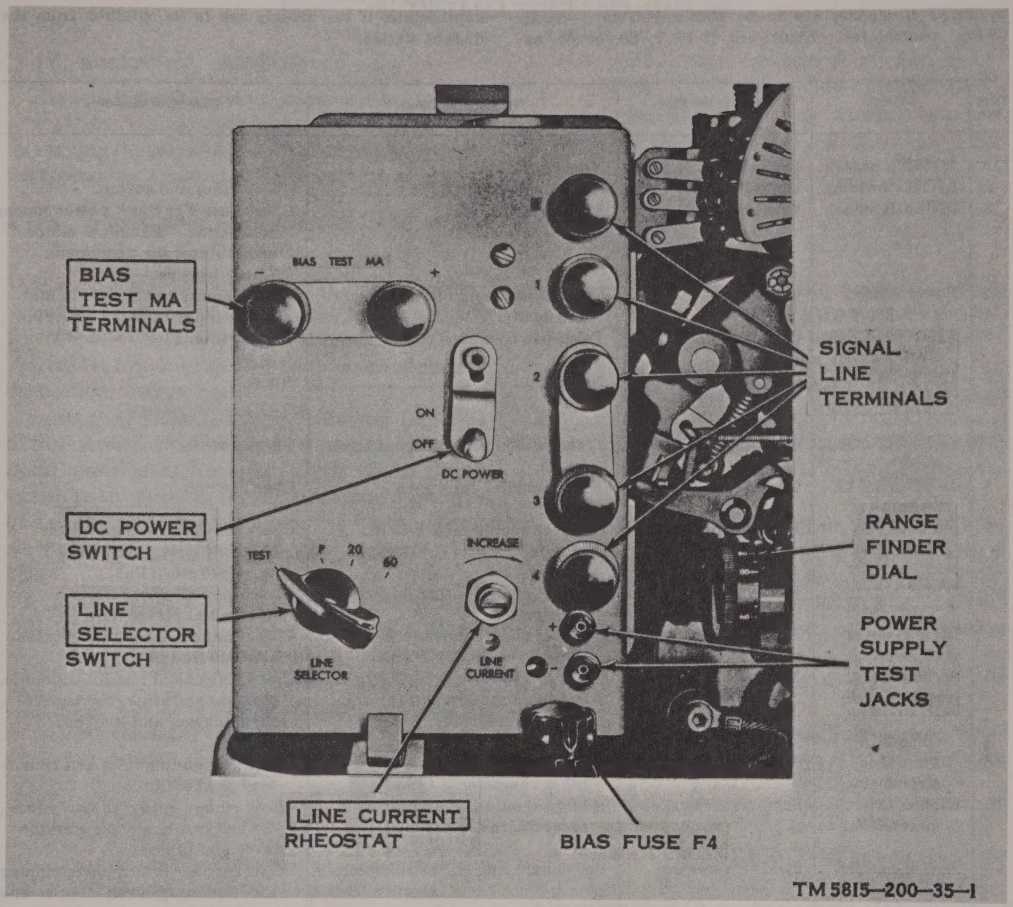


Figure 2–9. Terminal and switch box and rangefinder dial.

a. Adjust the rangefinder mechanism immediately after adjusting the BIAS resistor (para 2–13).

b. While receiving continuous R and Y signals from the keyboard, turn the rangefinder dial to the maximum and minimum good copy positions.

c. Set the rangefinder dial at the midpoint between the dial settings.

2–15. Operational Checks

a. Check the condition of the ribbon; if the printing is very light, or if the ribbon is worn, torn, or frayed, replace the ribbon (para 3–7).

b. Check the paper supply; if it is nearly depleted, install a new roll of paper (para 3–6*a*).

c. Check the operation of the sprocket feed pins (para 3–6*b*(3)).

2–16. Equipment Performance Checklist

Check the operation of the teletypewriter in the sequence listed in the chart below.

Note. Items 1, 2, 3, 5, 7, 8, and 16 through 19 do not apply to the TT–259/FG. To check items 12 through 14, arrange to have test signals transmitted to the TT–259/FG. Set the LINE SELECTOR switch (fig. 2–9)

to TEST if signals are to be obtained from a local, 60-ma., neutral test circuit; set it to P, 20, or 60, as appropriate, if the signals are to be obtained from the distant station.

Item No.	Item	Action or condition	Normal indications	Corrective measures
1	POWER switch	Operate to ON	None	None.
2	LIGHT switch	Operate to ON	Copy light should light	Check lamp and switch.
3	MOTOR switch	Operate to ON	Motor starts	Check fuse F1; check power source connection. Examine motor commutator for cleanliness. Check brushes.
4	Power switch (TT–259/FG).	Operate to ON	Copy lights should light; motor should start.	Check lamps, power switch, and power input fuses F1 and F2.
5	LINE SELECTOR switch.	Operate to TEST	Teletypewriter runs closed	Check switch.
6	DC POWER switch.	Operate to OFF (ON for TT–259/FG).	None	None.
7	SEND-LOCK switch.	Operate to SEND	Transmission possible from keyboard.	Check switch.
8	LINE-BREAK switch.	Operate to BREAK	Teletypewriter runs open	Check switch.
9	CAR RET button.	Press button	Carriage should return to left margin.	Check carriage return: button link; trip pawl; horizontal carriage return link.
10	LTRS button	Press button	Carriage should return to letters position.	Check manual unshift: push button link; lever link.
11	Manual space button.	Press button	Carriage should move from left to right.	Check manual space push button carriage feed link.
12	Automatic carriage return and line feed control.	Move carriage to right-hand margin.	Carriage should: (1) return to left-hand margin and (2) line feed automatically.	Check right hand margin trip plate, stop bar shift link, carriage return linkage, and line feed linkage.
13	Ribbon feed mechanism.	Send test message	Ribbon should feed as every other character is typed.	Check ribbon in guides and ribbon feed pawl action.
14	Ribbon lifter mechanism.	Send test message	Ribbon should rise and fall as every character is typed.	Check ribbon guide; ribbon vibrator bell crank; ribbon vibrator lever and bracket.
15	End-of-line signal bell.	Send test message	Bell should ring on 66th character	Check carriage return latch tripping arm and margin bell clapper and pawl.
16	SEND-LOCK switch.	Operate to LOCK	No transmission possible from keyboard.	Check switch.
17	MOTOR switch	Turn to OFF	Motor should stop	Check switch.
18	LIGHT switch	Turn to OFF	Light should be extinguished	Check switch.
19	POWER switch	Turn to OFF	None	Check switch.
20	Power switch (TT–259/FG).	Operate to OFF	Motor should stop; lights should be extinguished.	Check switch.

Section III. INSTALLATION AND LINE-UP

2–17. Equipment Applications

The teletypewriter set may be installed to meet several operational requirements. This is done by varying the connections of the signal lines to the teletypewriter (paras 2–18 and 2–20).

2–18. Signal Line Connections (Not applicable to TT–259/FG)

(figs. 2–9 and 2–10)

a. Set the POWER, LIGHT, MOTOR, and DC POWER switches to their OFF positions.

b. Refer to paragraph 2–6 for power and ground connection instructions.

c. Set the LINE CURRENT rheostat (fig. 2–9) to the extreme counterclockwise (maximum resistance) position and set the LINE SELECTOR switch to the position that corresponds to the type of signals to be used. Connect the teletypewriter as instructed in the applicable subparagraph below.

(1) *Neutral, half-duplex operation* (A, fig. 2–10).

(*a*) Strap terminals 2 and 3 of the terminal and switch box with the strap provided.

(*b*) For local supply of signal current, set the DC POWER switch to the ON position. Leave it in the OFF position for distant current supply.

(*c*) Connect the signal lines to terminals 1 and 4 of the terminal and switch box. If the distant station is to supply signal current, connect the positive signal line to terminal 1 and the negative signal line to terminal 4. This polarity arrangement also applies if both stations supply series-aiding battery (para 2–21 *e*(7) (*d*)).

(2) *Neutral or polar, receive-only operation* (B, fig. 2–10).

(*a*) Disconnect the strap between terminals 2 and 3 of the terminal and switch box.

(*b*) Connect the positive signal line to terminal 3 and the negative signal line to terminal 4.

(*c*) Line current normally is supplied and adjusted at the sending station. The only resistance in the receive circuit at the receive station is the resistance of the selector magnets. Refer to paragraph 2–20 for additional information covering receive-only operation.

(3) *Neutral full-duplex operation* (C, fig. 2–10).

(*a*) *Send circuit.* Disconnect the strap between terminals 2 and 3 of the terminal and switch box and connect the send signal lines to terminals 1 and 2. Set the DC POWER switch to the ON position to supply power for the send circuit. Send current is adjusted with the LINE CURRENT rheostat (para 2–21*e*).

(*b*) *Receive circuit.* Connect the positive signal line to terminal 3 and the negative signal line to terminal 4 of the terminal and switch box. When full-duplex operation is used, each station normally supplies and controls the line current in the send circuit.

2–19. Signal Line Connections and Final Adjustments (TT–259/FG)

Note. Before making the signal line connections perform the preinstallation checks (para 2–7 *a–c*)

a. Set the LINE SELECTOR switch (fig. 2–9) to P if the incoming signals are to be polar; set it to either 20 or 60, as appropriate, if the incoming signals are to be neutral.

b. Connect the incoming signal lines to signal line terminals 3 and 4 (positive polarity to terminal 3).

c. Arrange to have the distant station add or remove resistance to set the signal line current to the proper level (30 ma for polar operation; either 20 or 60 ma, as appropriate, for neutral operation).

d. Set the power switch to ON and have the distant station send alternate R and Y test signals. While receiving test signals, determine the high and low operating limits with the rangefinder dial and set the dial midway between the high and low readings.

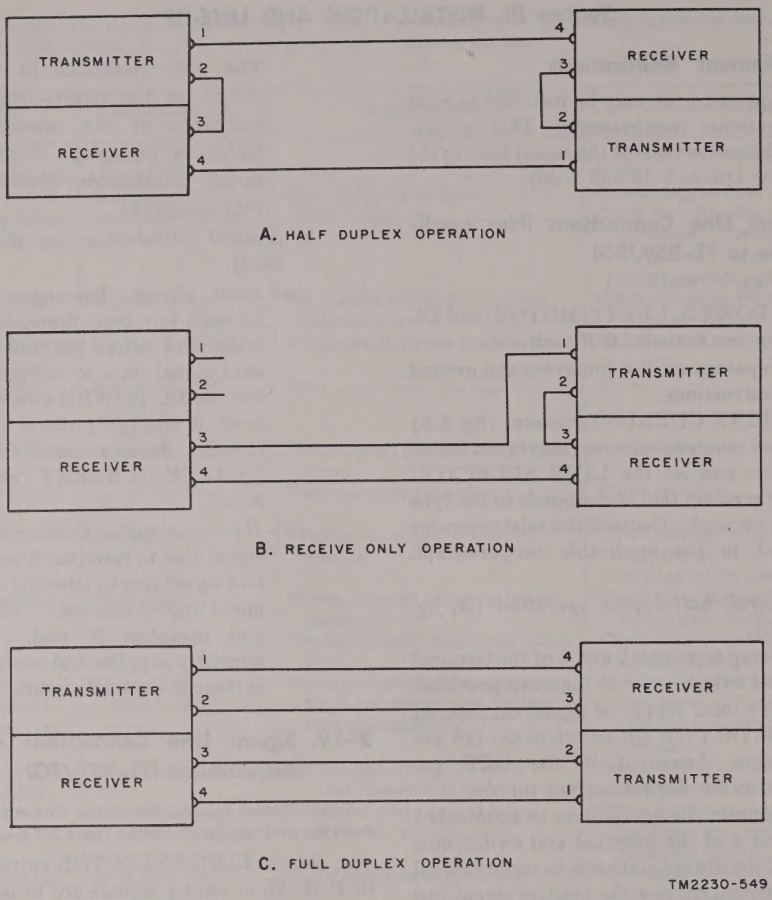


Figure 2–10. Signal line connections (Not applicable to TT–259/FG).

2–20. Equipment Modifications for Receive-only Operation (Not applicable to TT–259/FG)

(fig. 2–11)

When the teletypewriter is to be used for receive-only operation, proceed as follows:

a. Remove the keyboard guard (para 2–79, TM 11–5815–200–35) and its associated switches (S2, S3, S5, and S6) and wiring (para 2–84, TM 11–5815–200–35). Move the lead from terminal 1 of terminal board TB2 to terminal 3 (A, fig. 2–11, TM 11–5815–200–35).

(1) For receive-only operation without the motor stop feature and with the copy light controlled by the POWER switch, move the leads of TB1 (B, fig. 2–11) as follows:

(*a*) a BLK lead from terminal 5 to terminal 2;

(*b*) a WHT–RED lead from terminal 1 to terminal 2.

(2) For receive-only operation with the motor stop feature and with the copy light controlled by the motor stop feature, move the leads of TB1 (C, fig. 2–11) as follows:

(*a*) a BLK lead from terminal 5 to terminal 3;

(*b*) a WHT–RED lead from terminal 1 to terminal 2.

(3) For receive-only operation with the motor stop feature and with the copy light controlled by the POWER switch, move the leads of TB1 (D, fig. 2–11) as follows:

(*a*) a BLK lead from terminal 5 to terminal 3;

(*b*) a WHT–RED lead from terminal 1 to terminal 3.

b. Remove the keyboard plug from the keyboard jack and remove the keyboard transmitter (para 2–18, TM 11–5815–200–35).

c. Remove the two machine screws and lockwashers from the keyboard transmitter drive shaft bearing cap (fig. 2–62, TM 11–5815–200–35). Remove the two machine screws and lockwashers from the transmitter drive shaft mounting bracket, and remove the keyboard transmitter drive shaft from the teletypewriter. Replace the bearing cap with the two machine screws and lockwashers.

d. Install the receive-only dust cover adapter on the dust cover.

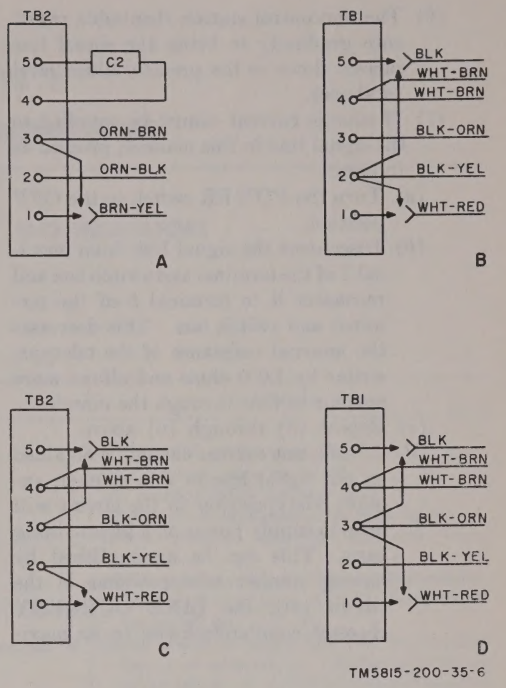


Figure 2–11. Wiring changes for receive-only operation.

2–21. Circuit Line-up (Not applicable to TT–259/FG)

a. For best operation, adjust the teletypewriter to meet the conditions of the signal line. Circuit lineup for these teletypewriters normally includes adjusting the line current and rangefinder dial for the equipment at both ends of the circuit, followed by an exchange of test copy.

b. The station from which the circuit lineup is directed is called the control station. Generally, the station of higher authority is the control station. Lineup of a circuit between stations of equal authority normally is directed by the station that has the lowest numerical designation.

c. Line current for any particular signal line in a teletypewriter system usually is supplied by the station in the network that has the transmitting device on that signal line. If two or more stations have transmitting devices on the signal line, the station of highest authority usually supplies the line current. Two or more stations may supply current when necessary because of excessive line leakage or other line factors.

d. Polar or neutral signals can be received by the teletypewriter but only neutral signals can be sent from the keyboard transmitter. Polar signals must be 30 ma and neutral signals may be either 20 or 60 ma.

e. Line current normally is adjusted as follows:

(1) Turn the POWER switch to the ON position.

(2) If the teletypewriter is to supply signal line current, set the DC POWER switch to the ON position.

(3) The control station turns its LINE CURRENT rheostat to the maximum counterclockwise (maximum resistance) position.

(4) The noncontrol station turns its LINE CURRENT rheostat to the maximum clockwise (minimum resistance) position.

(5) The control station gradually decreases resistance until the current reaches 75 ma for 60-ma circuits or 30 ma for 20-ma circuits.

(6) The noncontrol station then adds resistance gradually to bring the signal line current down to the predetermined level (*d* above).

(7) If enough current cannot be supplied to the signal line in this manner, proceed as follows:

(*a*) Turn the POWER switch to the OFF position.

(*b*) Disconnect the signal line from terminal 1 of the terminal and switch box and reconnect it to terminal 5 of the terminal and switch box. This decreases the internal resistance of the teletypewriter by 1,000 ohms and allows more current to flow through the circuit.

(*c*) Repeat (3) through (6) above.

(*d*) If sufficient current cannot be obtained on the signal line in this manner, another teletypewriter in the circuit will have to supply power on a series-aiding basis. This can be accomplished by having another teletypewriter in the circuit turn the LINE CURRENT rheostat counterclockwise to its maximum desistance position, turn the DC POWER switch to the ON position, and then adjust the LINE CURRENT rheostat to decrease the resistance until the proper signal line current is obtained.

(*e*) If the current decreases instead of increasing, reverse the signal line connections.

f. Adjust the rangefinder dial (fig. 2–9) as follows:

(1) Noncontrol stations transmit repeated R and Y signal code groups. The control station turns its rangefinder dial to the maximum and minimum good copy positions. Determine the midway point between the two settings and set the rangefinder dial at this point. When the setting is complete, the control station signals the noncontrol stations with two 5-second break signals.

(2) The control station now transmits repeated R and Y signal code groups and the noncontrol stations adjust the rangefinder dials in the same manner.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. CONTROLS AND INDICATORS

3-1. Controls and Their Uses (Except TT-259/FG)

a. Keyboard Controls (figs. 3-1 and 3-2).

Control	Location	Function
MOTOR switch	Left side of keyboard guard	ON position turns motor on. OFF position turns motor off.
LIGHT switch	Left side of keyboard guard	ON position lights the copy light. OFF position extinguishes the copy light.
SEND-LOCK switch	Right side of keyboard guard	LOCK position prevents keyboard transmission. SEND position allows keyboard transmission.
LINE-BREAK switch	Right side of keyboard guard	Opens signal line; used to start motors when turned off by STOP key.
FIGS key	Bottom row, extreme left hand end of keyboard.	Shifts platen to upper-case position to allow typing of numerals (or weather symbols on AN/FGC-21 or AN/FGC-64), punctuation marks, and other characters, or performance of functions.
LTRS key	Bottom row, third from right hand end of keyboard.	Returns platen to lower case position to allow typing of letters. Has no effect except when struck after FIGS has been struck.
LINE FEED key	Bottom row, second from right hand end of keyboard.	Moves paper up one or two line spaces on platen depending on position of single-double line feed lever.
CAR RET key	Middle row, extreme right hand end of keyboard.	Returns carriage (type basket) to extreme left margin of paper.
BELL key (upper case S)	Middle row, second from left hand end of keyboard.	Rings the signal bell.
STOP key (upper case H)	Middle row, fifth from right hand end of keyboard.	Turns off motor to place machine on standby basis.
REPEAT key	Top row, extreme right hand end of keyboard.	Repeats the last character or function sent from the machine (except CAR RET), for as long as the two keys are held depressed.
Alphabet keys	Keyboard	Causes the printing of the letter, or symbol, as shown on the key top.
Blank key	Bottom row, extreme right hand end of keyboard.	Transmits blank code group. Used as part of motor stop operation in weather communications machines; prints hyphen when in upper case.
Space bar	Bottom of keyboard	Causes carriage to move to the right without printing.

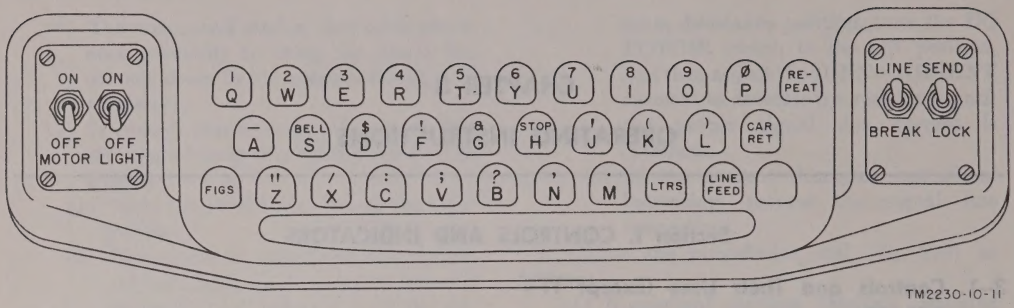


Figure 3–1. Standard communications keyboard.

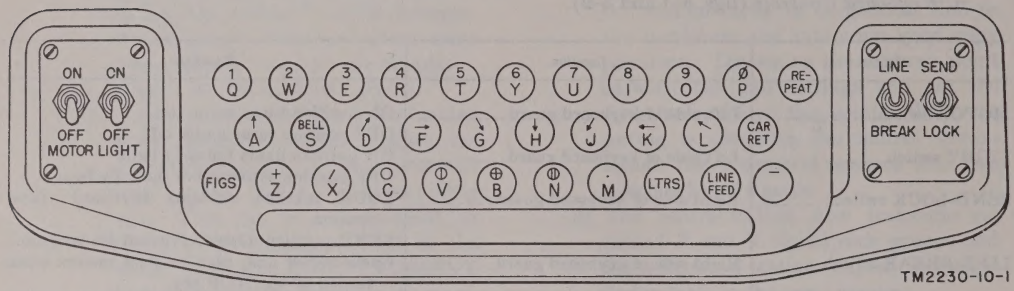


Figure 3–2. Weather communications keyboard.

b. Teletypewriter Controls (figs. 1–3, 1–6, and 3–3).

Control	Location	Function
POWER switch	Right-hand side, rear, of teletypewriter or on the front dust cover of the TT–259/FG.	ON position connects ac input to the teletypewriter. OFF position disconnects ac input to the teletypewriter.
Manual CAR RET button	On the front of the teletypewriter, right-hand side.	Returns carriage (type basket) to extreme left margin of paper.
Manual LTRS button	On the front of the teletypewriter, left-hand side.	Returns platen to lower-case position. Has no effect except when pressed after FIGS has been struck.
Platen crank	Left-hand side of teletypewriter	Rolls the paper from the platen so the message can be torn off.
Single double line feed lever	Left-hand side of platen	In the forward position, causes the platen to move one space. In the rear position, causes the platen to move two spaces.
Sprocket cam plate	Left-and right-hand side of platen	Feeds out the sprocket feed pins for use with sprocket-fed forms.
Pressure roller lever	Right-hand side of platen	When pulled forward, releases pressure on the paper. In the rear position, holds paper tightly against the platen.
Platen lever latch	Right-hand side of platen	Locks the pressure roller lever in either the applied or released position.
Manual space push button	Right-hand side of platen	When pressed, causes the carriage to move from the left to the right.

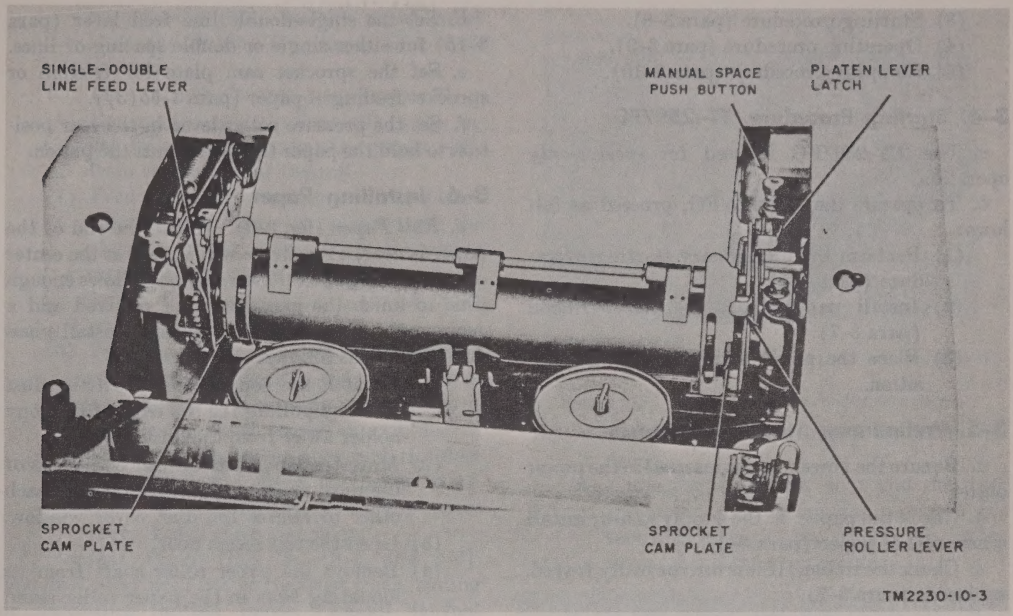


Figure 3–3. Platen controls and manual space push button.

3–2. Indicators and Their Uses

Control	Location	Function
Margin bell	Under teletypewriter cover	Rings on 66th character to warn operator that end of line is near. (Not applicable to the TT–259/FG.)
Signal bell	Under teletypewriter cover	Used to signal distant operator.

Section II. OPERATION

3–3. Types of Operation (Except TT–259/FG)

Teletypewriter sets may be operated on either half-duplex, full-duplex, or receive-only operation. The type of operation is determined prior to installation and is accomplished by wiring connections at the time of installation.

a. Half-Duplex Operation. In half-duplex operation, the message typed on the keyboard will be recorded on all teletypewriters, including the originating teletypewriter. Only one teletypewriter may send at a time.

b. Full-Duplex Operation. In full-duplex operation, both machines may send at the same time; however, the sending machine does not record the message it is sending.

c. Receive-Only Operation. In receive-only operation, the keyboard is removed or disabled by the SEND-LOCK switch, and the machine can receive only.

d. Preparation for Operation. To operate the equipment for any particular type of operation, perform the following:

(1) Preliminary starting procedure (para 3–5).

(2) Installation of paper (para 3–6) and ribbon (para 3–7).

(3) Starting procedure (para 3-8).
(4) Operating procedure (para 3-9).
(5) Stopping procedure (para 3-10).

3-4. Starting Procedure, TT-259/FG

a. The TT-259/FG is used for *receive-only* operation.

b. To operate the TT-259/FG, proceed as follows:

(1) Perform the preliminary starting procedure (para 3-5).
(2) Install paper (para 3-6) and ribbon (para 3-7).
(3) Place the power switch in the ON position.

3-5. Preliminary Starting Procedure

a. Be sure the power cord is inserted in the power outlet.

b. Check the paper; if the supply is low, install a new roll of paper (para 3-6).

c. Check the ribbon; if it is torn or badly frayed, replace it (para 3-7).

d. Set the single-double line feed lever (para 3-1*b*) for either single or double spacing of lines.

e. Set the sprocket cam plate for friction or sprocket feeding of paper (para 3-6*b*(3)).

f. Set the pressure roller lever in the rear position to hold the paper tightly against the platen.

3-6. Installing Paper

a. Roll Paper (fig. 3-4). When the end of the paper is near, a red stripe will appear at the center or side of the paper. This marking allows enough time to finish the message being received and a new supply of paper to be obtained. Install a new roll of paper as follows:

(1) Unlatch the copy holder from the dust cover by pulling the top edge of the copy holder away from the dust cover.
(2) Move the latch buttons (on both sides of the dust cover window) away from each other to release the dust cover window.
(3) Open the top access door.
(4) Remove the paper roller shaft from its mounting slots in the paper roller stand

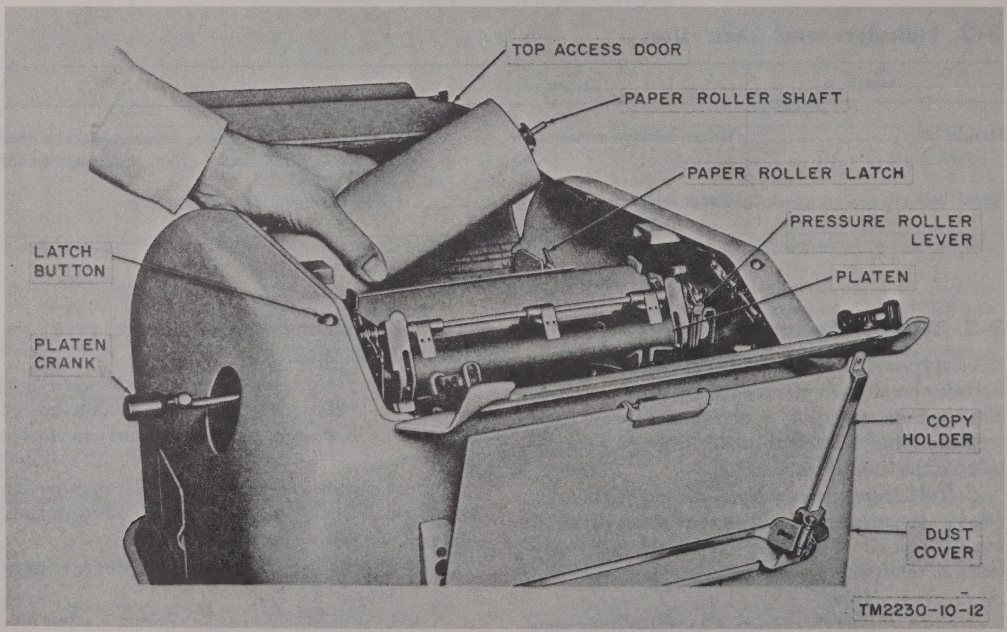


Figure 3-4. Installing paper roll.

by pressing down on the paper roller latch and pulling the paper roller shaft upward.

(5) Insert the shaft into a new paper roll.

(6) Replace the paper roller shaft in the paper roller stand so that the paper feeds from the bottom of the roll.

(7) Feed the paper into the rear of the platen assembly, between the platen and the platen pressure roller. Turn the platen crank counterclockwise until several inches of paper stand up, almost vertically, in front.

(8) Pull the pressure roller lever forward and center the paper on the platen; make sure the paper is feeding straight and is free from creases, twists, or wrinkles.

(9) Close the top access door and the dust cover window. Allow the paper to extend out over the top of the top access door. Latch the copyholder.

b. Fanfold Paper (figs. 3-3, 3-5, and 3-6). The dust cover need not be removed when loading or unloading fanfold paper. Install fanfold paper as follows:

(1) Open the top access door and the dust cover window (*a*(1) and (2) above).

(2) Remove the paper roller shaft (*a*(4) above).

(3) Insert a screw driver or like object into a slot in the sprocket cam plate (fig. 3-3) and turn the sprocket cam plate to extend the sprocket feed pins (fig. 3-5).

(4) Release the pressure roller lever.

(5) Place a box of fanfold paper on the fanfold form rack (fig. 3-6), located under the table top directly in front of the operator.

(6) Thread the loose ends of the paper at the top of the box through the guide chute in the table.

(7) Bring the paper over the top of the teletypewriter and thread it into the rear of the platen assembly, between the platen and the platen pressure roller. Straighten the paper and make sure the sprocket feed pins mesh properly with the perforations at the edges of the paper (fig. 3-5). Turn the platen crank counterclockwise until several inches of paper stand up, almost vertically, in front.

(8) Close the top access door and the dust cover window. Allow the paper to extend out over the top of the top access door. Latch the copyholder.

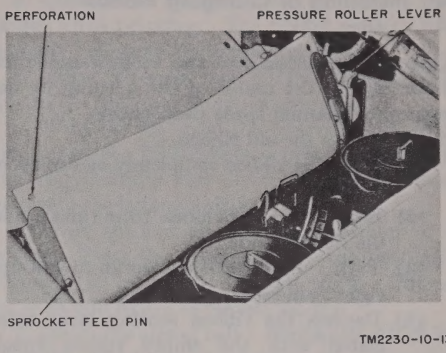


Figure 3-5. Fanfold paper threaded into platen.

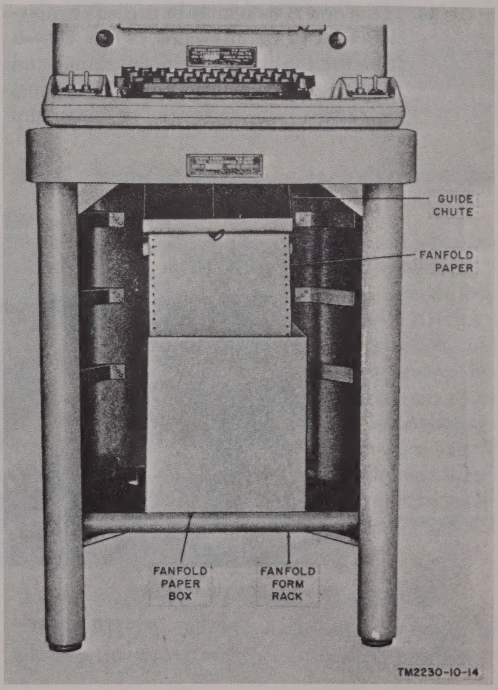


Figure 3-6. Fanfold paper placed in table.

3-7. Installing or Changing Ribbon
(fig. 3-7)

Open the top access door and window and space the carriage to the center of the opening by depressing the manual space push button.

a. To remove the old ribbon—
- (1) Wind the ribbon completely on one spool by hand.
- (2) Remove the old ribbon from the slots in the ribbon guide.
- (3) Turn the ribbon spool locks to the upright (unlocked) position.
- (4) Depress the ribbon sensing lever associated with the empty ribbon spool. Lift out the empty ribbon spool and detach the end of the ribbon. Save the empty spool for winding the new ribbon.
- (5) Depress the ribbon sensing lever associated with the full ribbon spool. Lift out the full ribbon spool and discard it and the worn ribbon.

b. Install a new ribbon as follows:
- (1) If the new ribbon must be turned counterclockwise to be unwound (when viewed from the top), place it in the right hand ribbon drive mounting cup. If it must be turned clockwise to be unwound (when viewed from the top), place it in the left hand ribbon drive mounting cup. Aline the two holes in the ribbon spool with the lugs on the ribbon spool driven shaft collar.
- (2) Pull about 12 inches of ribbon through the slotted opening at the rear of the ribbon drive mounting cup and fasten the loose end of the ribbon to the empty ribbon spool.
- (3) Insert the ribbon in the slots in the ribbon guide; make sure that it is flat and free from twists. The ribbon should pass in front of the stop plate.
- (4) Turn the ribbon spool locks to the horizontal (locked) position.
- (5) Tighten the ribbon manually by turning one ribbon spool with one hand while holding the other ribbon spool rigid.

c. After each ribbon installation, and at reasonable intervals thereafter, make the following ribbon checks:
- (1) The ribbon must be taut and free from twists, wrinkles, creases, holes, and tears. It must lie flat in the slots on the backs of the ribbon drive mountings and in the ribbon guide.

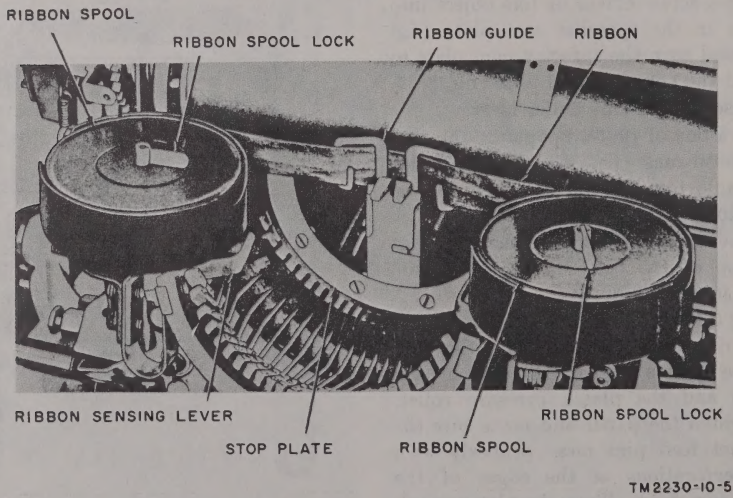


Figure 3-7. Ribbon mechanism.

(2) Both ribbon spools must turn in the same direction while the teletypewriter is typing.
(3) Both ribbon spools must be seated horizontally in the ribbon drive mountings, and the ribbon spool locks must be set horizontally.
(4) Both ribbon spools must reverse direction when a ribbon spool is emptied.

3–8. Starting Procedure for Teletypewriter Sets

a. To start the teletypewriter set after it has been closed down for an extended period of time—
(1) Place the POWER switch in the ON position.
(2) Place the SEND-LOCK switch in the SEND position for half-duplex or full-duplex operation, or in the LOCK position for receive-only operation.
(3) Place the LIGHT switch in the ON position.
(4) Place the MOTOR switch in the ON position.

b. To start the motor after it has been shut down by the motor stop function, proceed as follows:
(1) Check to see that the MOTOR switch is in the ON position.
(2) Operate the LINE-BREAK switch to the BREAK position for approximately 5 seconds; then restore it to the LINE position.

3–9. Operating Checks for Teletypewriter Sets

Operate the teletypewriter and check for the following:

a. The margin signal bell should ring when the 66th character is printed. The automatic line feed and carriage return should operate after the 72d character (76th character on weather machines) is printed. Carriage return should take place when the carriage return code impulse is received.

b. Observe the action of the ribbon feed mechanism while printing. The ribbon must be lifted and fed each time a character is typed.

c. Check the space bar, FIGS key, and LTRS key to see that they function properly.

d. With the platen in the figures (raised) position, press the LTRS button protruding through the teletypewriter dust cover. The platen should return to the letters position.

e. Space the carriage toward the center of the platen. Press the CAR RET button protruding through the teletypewriter dust cover. The carriage should return to the left margin.

f. Check the signal bell. Strike the FIGS key, then the BELL key (uppercase S). The signal bell should ring.

g. Check the motor stop function. Strike the FIGS key, then the STOP (uppercase H) key for standard communication keyboards or strike the FIGS key, the BLANK key, and then the STOP (uppercase H) key for weather communication keyboards. The motor should stop.

h. Operate the LINE-BREAK switch (para 18*b*(2)). The motor should start.

i. Operate the REPEAT key, together with any character or function key except CAR RET. The character or function selected should be repeated until the REPEAT key is released.

3–10. Stopping Procedure for Teletypewriter Sets

a. During operation, a teletypewriter operator at any sending station can stop the motors of all teletypewriters equipped with the motor stop feature in the circuit by striking the FIGS key, placing all machines in the figures position, and then the STOP key on standard communication keyboards, or the BLANK key and then the STOP key on weather communication keyboards. The motors of all page printers in the circuit will be stopped and will remain in standby condition.

b. Stop the teletypewriter and close it to traffic by placing the MOTOR, LIGHT, and POWER switches in the OFF positions.

3–11. Stopping Procedure, TT–259/FG

Stop the TT–259/FG and close it to traffic by placing the power switch in the OFF position.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

4-1. Scope of Maintenance

The maintenance duties assigned to the operator of the teletypewriter set are listed below together with a reference to the paragraphs covering the specific maintenance function. The duties assigned do not require tools or test equipment.

a. Daily preventive maintenance checks and services (para 4-4).

b. Weekly preventive maintenance checks and services (para 4-5).

c. Rangefinder adjustment.

d. Operational test.

4-2. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 4-4 and 4-5 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services chart (para 4-4) outlines functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and what the normal conditions are; the *references* column lists the illustrations, paragraphs, or manuals that contain supplementary information. If the defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

4-3. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the teletypewriter set are required on a daily and weekly basis.

a. Paragraph 4-4 specifies checks and services that must be accomplished daily or under the conditions listed below.

(1) When the equipment is initially installed.

(2) When the equipment is reinstalled after removal for any reason.

(3) At least once each week if the equipment is maintained in standby condition.

b. Paragraph 4-5 specifies additional checks and services that must be performed once each week.

4–4. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Teletypewriter set	Check the equipment for completeness. Requisition missing items.	App and fig. 1–5.
2	Exterior surfaces	***Warning:*** **Cleaning Compound (FSN 7930–395–9542) is flammable and its fumes are toxic. Do not use near a flame; provide adequate ventilation.** Clean keytops (except on TT–259/FG), glass (access window), and dust cover. Use water and a mild soap. Use cleaning compound on dirt and stains that are hard to remove.	
3	Signal line and power cord	Check the signal line and power cord; eliminate any sharp bends or severe twists; examine the insulation for dry rot, cuts, breaks, or fraying.	
4	Inking ribbon	Examine the inking ribbon; look for holes, tears, missing eyelets, or fraying. If necessary, replace the ribbon.	Para 3–7.
5	Paper supply	Check the installation and threading of a paper in the teletypewriter. If fanfold paper is being used, see that the sprocket feed pins are extended and are meshed with the holes in the paper. Replenish paper if the supply is nearly exhausted.	Para 3–6.
6	Switches	Operate the switches within the keyboard guard (except on the TT–259/FG) and the POWER switch. Observe that the mechanical action of each switch is smooth and free of external or internal binding.	Figs. 1–3 and 3–2.
7	Keytops and spacebar	Check for loose, missing, damaged, or illegible keytops; check for loose or damaged spacebar.	
8	Operational check (except TT–259/FG).	Perform an operational check of the equipment. Printed copy should be legible and the letters evenly spaced.	Paras 3–8, 3–9, and 3–10.

4–5. Weekly Preventive Maintenance Checks and Services

Check the range of the teletypewriter set as follows and set the rangefinder dial at the midpoint between the minimum and maximum good copy points.

Caution: **The rangefinder dial should be moved only when signals are being received in the selector magnet and the selector camshaft is rotating.**

a. While receiving RY or test message, rotate the rangefinder dial slowly, toward the upper limit of its scale, until errors begin to appear in the printed copy. Stop turning the dial and record the dial indication as the upper range limit.

b. Rotate the rangefinder dial slowly, toward the lower limit of its scale, until errors begin to appear in the printed copy. Stop turning the dial and record the dial indication as the lower range limit.

c. Subtract the figure recorded in *b* above from the figure recorded in *a* above to obtain the range of the teletypewriter. Divide the range by 2, and then add this figure to the low limit or subtract it from the upper limit and set the rangefinder dial at this point.

d. The range should be not less than:

(1) 72 divisions on the rangefinder dial for 60-wpm operation.

(2) 60 divisions on the rangefinder dial for 100-wpm operation.

4–6. Visual Inspection

a. When the equipment fails to perform properly, turn off the power and check all the items

listed below. *Do not check any item with the power on.*

(1) Switches and controls, improper settings (para 3–8).

(2) Power cable connectors, worn, broken, or disconnected.

(3) Ground connection, loose, broken, or disconnected.

(4) Ribbon (para 3–7*c*).

b. Correct any deficiencies discovered. If the corrections do not restore the equipment to use, notify the organizational maintenance personnel.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

5–1. Disassembly of Equipment

Disassemble the teletypewriter as follows:

a. Remove the power input plug from the binding posts.

b. Disconnect the signal lines from the binding posts.

c. Remove the paper roll or fanfold forms for the teletypewriter.

d. Lock the platen in place with the platen lock.

e. Lock the carriage at the left hand margin with the carriage lock or with the blocking plate.

f. Remove the teletypewriter from the table.

5–2. Repackaging for Shipment or Limited Storage

a. The exact procedure for repacking depends on the material available and the conditions under which the equipment is to be shipped or stored. If the original packing materials are on hand, use them and reverse the unpacking procedures given in paragraph 2–1.

b. The prime requirement is to pack the equipment so as to prevent damage during transit or limited storage. Package the equipment securely and use sufficient wadding to minimize the effects of severe jolting. Make sure that the equipment is protected from rain or snow.

Section II. DEMOLITION OF MATERIAL TO PREVENT ENEMY USE

5–3. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedures outlined in paragraph 5–4 will be used to prevent further use of the equipment.

5–4. Methods of Destruction

Use any of the following methods to destroy the equipment:

a. Smash. Smash the controls, magnets, switches, capacitors, transformers, castings, shafts, gears, and bearings; use sledges, axes, handaxes, pickaxes, hammers, or crowbars.

b. Cut. Cut the power cord, signal lines, and all base wiring; use axes, cutting pliers, bayonets, or machetes.

c. Burn. Burn all cords, wiring diagrams, technical manuals, coils, and relays; use gasoline, kerosene, oil, flamethrowers, or incendiary grenades.

d. Bend. Bend covers, tables, and bases.

e. Explode. If explosives are necessary, use firearms, grenades, or TNT.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:
Active Army:

USASA (2)
CNGB (1)
CC–E (7)
Dir of Trans (1)
CofSptS (1)
TSG (1)
CofSpts (1)
USAARMBD (2)
USAARTYBD (2)
USACDCEA (1)
USACDCCBRA (1)
USACDCCEA (1)
USACDCOA (1)
USACDCQMA (1)
USACDCTA (1)
USACDCADA (1)
USACDCARMA (1)
USACDCAVNA (1)
USACDCARTYA (1)
USACDCSWA (1)
USACDCCEA (Ft Huachuca) (1)
USACDCEC (10)
USCONARC (5)
ARADCOM (5)
ARADCOM Rgn (2)
OS Maj Comd (4)
LOGCOMD (2)
USAECOM (30)
USAMICOM (4)
USASMC (2)
USASCC (4)
MDW (1)
Armies (2) except EUSA (5)
Corps (2)
USAC (3)
11th Air Aslt Div (3)
USMA (2)
Svc Colleges (2)
Br Svc Sch (2) except
USASESCS (80)
USAAMS (30)
USAIS (30)
USAARMS (30)
USAQMS (5)
USASCS (5)
BAMC (5)
AMS (1)
JUSMMAT (5)
507th USASA Gp (5)
508th USASA Gp (5)
318th USASA Co (5)
319th USASA Co (5)
320th USASA Co (5)
USABIOLABS (5)
USATTC (5)
USATC (2)
WRAMC (1)
Army Pic Cen (2)
Instl (2) except
Ft Monmouth (70)
Ft Gordon (10)
Ft Huachuca (10)
Ft Knox (12)
Ft Carson (25)
WSMR (5)
Gen Dep (2)
Sig Sec, Gen Dep (5)
Sig Dep (12)
Army Dep (2) except Ft Devens (5)
LBAD (14)
SAAD (30)
TOAD (14)
FTWOAD (10)
LEAD (7)
SHAD (3)
NAAD (5)
SVAD (5)
CHAD (3)
ATAD (10)
USACRREL (2)
USAERDAA (2)
USAERDAW (13)
Sig Fld Maint Shops (2)
Units organized under following TOE's (2 copies each unless otherwise indicated):

11–57	11–587
11–97	11–592
11–98	11–597
11–117	29–500
11–127	33–56
11–155	33–500 (AA–AC)
11–157	55–158
11–500 (AA–AC)	

NG: State AG (3).
USAR: None.
For explanation of abbreviations used, see AR 320–50.

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